April 3, 1939

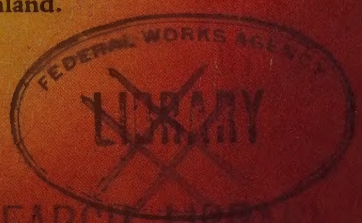
STEEL

ODUCTION • PROCESSING • DISTRIBUTION • USE
ESTABLISHED 1882

SHEETS *and* STRIP

With greatly increased capacity, Inland mills assure adequate tonnage, uniform high quality and prompt delivery . . . and our experienced metallurgists are at your daily service to aid in cost reduction and product improvement. You can *depend* on Inland.

INLAND STEEL



INLAND STEEL

NEW

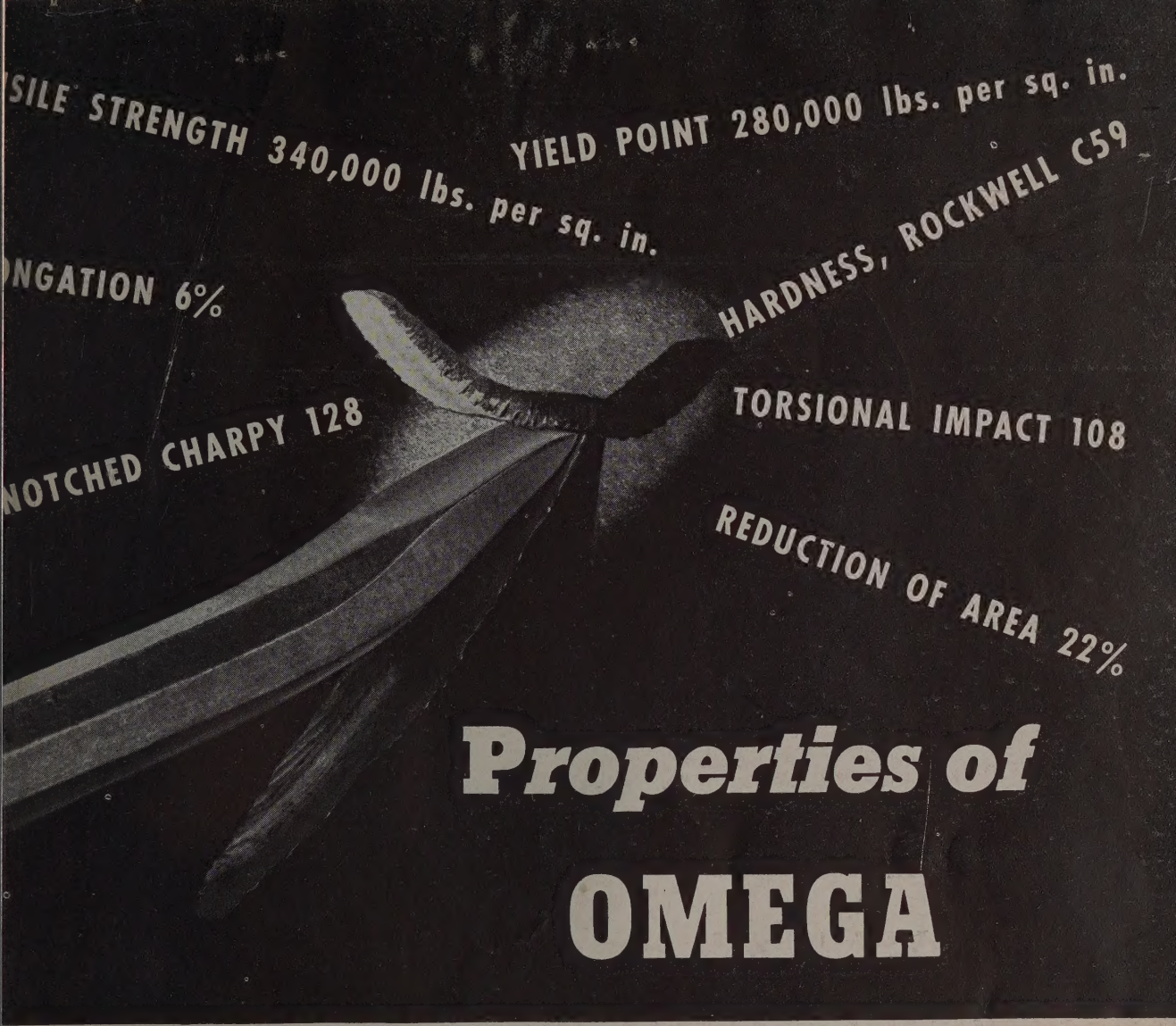
BORE-MATIC PRECISION ON HEAVY WORK WITH THIS NEW HEALD No. 42 MULTI-DUTY BORE-MA

LARGE, heavy work requiring accurate finishing on multiple surfaces can now be produced with all the high precision and finish of the borizing process on the new Heald No. 42 Multi-Duty Bore-Matic. Entirely new in design, the No. 42 has two hydraulically controlled tables at right angles, a rear table with forward movement for precision boring, turning, plunge grooving, plunge facing, and a front table with side movement for generated precision facing and indexing.

For a multiple spindle machine the No. 42 is extremely compact and requires very little floor space. All stations are equally accessible from the front of the machine, including loading and unloading, tool setting, and operation of the machine itself. And the machine is extremely rugged with ample power and rigidity to handle smoothly multiple cuts on a wide variety of heavy work.

The above No. 42 M
Duty Bore-Matic per
eleven precision opera
on pump bodies, incl
boring, turning, groo
counterboring, plunge f
and generated facing.
sults show improved q
of accuracy and finish
substantial savings du
increased production,
set-ups and lower tool

THE HEALD MACHINE CO. Worcester Mass. U. S


ISILE STRENGTH 340,000 lbs. per sq. in.
YIELD POINT 280,000 lbs. per sq. in.
ONGATION 6%
HARDNESS, ROCKWELL C59
NOTCHED CHARPY 128
TORSIONAL IMPACT 108
REDUCTION OF AREA 22%

Properties of OMEGA

that add up to

SUPER-SHOCK-RESISTANCE

These physicals, resulting from quenching in oil at 1600 deg. F. and tempering at 450 deg. F., make Omega a natural for hand and pneumatic chipping chisels, heading tools, punches and similar tools.

Other Bethlehem Tool Steels are equally outstanding in their respective fields. For quick and accurate selection of the proper grade for the task refer to the Bethlehem Tool Steel Guide. If you do not have a copy, we will gladly send you one.

FEDERAL WORKS AGENCY
LIBRARY
RESEARCH LIBRARY
WORKS PROGRESS ADMINISTRATION

BETHLEHEM STEEL COMPANY

By a skillful application of a well known principle, Ohi
produces rolls that assure you of these great advantage

1. Ingotism reduced
2. Better heat treatment possible
3. Internal hot rupture eliminated
4. Improved fatigue resistance in necks

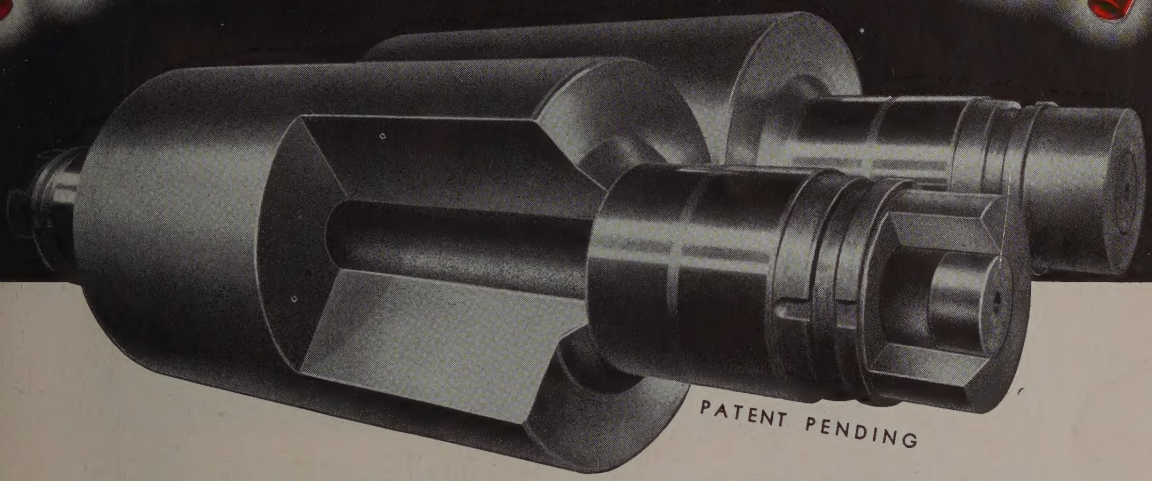
Result...

LOWER ROLL COST PER TO

THE OHIO STEEL FOUNDRY COMPA

Strike!

HOLL-O-CAST



PATENT PENDING

STEEL ROLLS

Made by the makers of...

CARBON STEEL ROLLS
ALLOY STEEL ROLLS
OHIOLOY "K" ROLLS
PLAIN CHILLED IRON ROLLS
ALLOY IRON ROLLS
DENSO-IRON ROLLS
MOLYBDENUM CHILL ROLLS
NICKEL CHILL ROLLS
FLINTUFF ROLLS

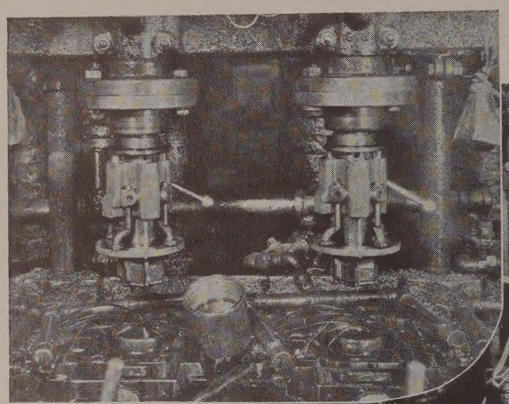
MA, OHIO and SPRINGFIELD, OHIO

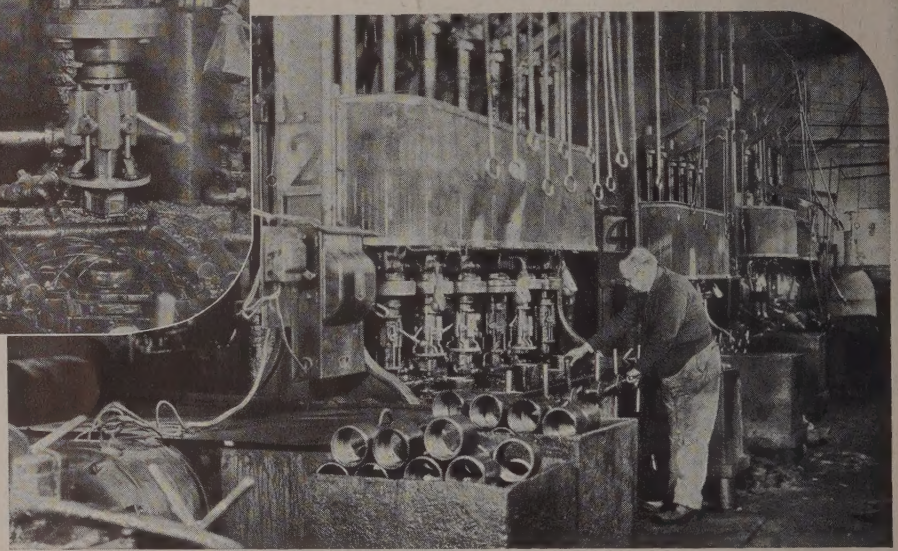
The THREADS of Industry

Casing, Tubing, and Drill Pipe (API) Threads Must be Accurate

LANDIS Receding Chaser COLLAPSIBLE TAPS maintain high standards of *Accuracy*, and are

DEPENDABLE!





A large mid-western Steel Corp. employs LANDIS Style LM Receding Chaser Collapsible Taps for threading line pipe, casing, tubing and drill pipe couplings.

The unusually sturdy construction of this tap insures threads of the finest quality. The simple manner in which size adjustments are made assures *positive* and *accurate* size control at all times.

In the photographs above LANDIS Style LM Receding Chaser Taps are shown threading 4″ diameter line pipe couplings. The exacting API specifications for these threads are easily maintained and the taps average 12 complete couplings per hour.

Investigate the many outstanding advantages of LANDIS Receding Chaser Collapsible Taps. Write us today for information.

This THREAD OUTLINE

illustrates the type of thread which is generally employed for oil tubular goods.

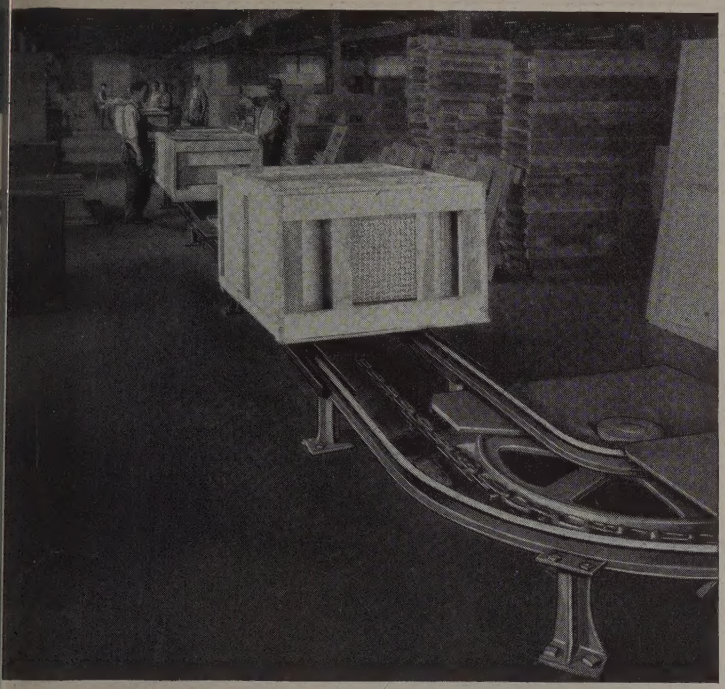
The specifications for casing, tubing, and drill-pipe threads were set up by the American Petroleum Institute, October 20, 1924. This thread form is basically the Briggs Standard Form with certain modifications and it has been approved by the National Screw Thread Commission.

Many special thread forms have been developed in recent years but the A.P.I. specifications for oil tubular goods continue to be most widely used. This is due, without a doubt, to the efficiency of the thread and to its machinability.

Landis Machine Co., Inc.
Waynesboro, Pa.

Vol. 104, No. 14, April 3, 1939, issue of STEEL, published every Monday at Cleveland, O. Entered as second-class matter at the postoffice, Clevelar O., under act of March 3, 1879. U. S. and Canada: 1 year, $4; 2 years, $6; foreign countries, 1 year, $10; Current issues, 25c.

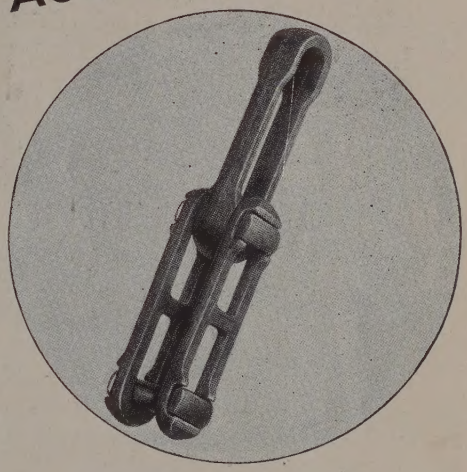
UP, DOWN—ACROSS AND AROUND



HERE'S HOW TO HANDLE IT ON THE ASSEMBLY LINE!

Modern refrigerators take form on this Rex Drop Forged Chain Conveyor. From the very beginning of assembly they never leave the conveyor—reach the shipping room shown above in fast time even according to modern high-speed production standards. The rugged Rex Drop Forged Chain takes them up and down, around corners, even doubles back on itself—starts, stops, pulls and carries with the smoothness and dependable sturdiness that maintains high unit production, low unit handling cost.

Whether you are making refrigerators or gas ranges, automobiles or radios you know that a smooth working assembly line is the kind to have—the kind that makes money for you. That's what you get with a Rex-equipped conveyor—it keeps men and machines working at their best speed uninterrupted by ordinary conveyor line trouble. Ask the Rex representative about the Rex background in assembly line conveyor service. He will show you many ways in which Rex chain can be of real value to you.



REX DROP FORGED CHAIN: Detachable, with drop forged steel pins and side bars, one of the strongest yet simplest chains for its weight on the market today. Described in the folder with the complete line of Rex chains, *"How to Handle IT In Every Industry."* Send for your copy. Use the handy coupon below.

REX DRIVE AND CONVEYOR CHAINS

CHAIN BELT COMPANY of Milwaukee

CHAIN BELT COMPANY
1660 W. Bruce St., Milwaukee, Wisconsin

Please send me my copy of the book, "How to Handle IT In Every Industry."

Firm Name _____

By _____ *Title* _____

Address _____

City _____ *State* _____

NATIONAL STEEL

NOW OFFERS A HIGH TENSILE STEEL WITH UNUSUAL

Ductility

HERE AT LAST IS THE HIGH TENSILE STEEL THAT ENGINEERS AND PRODUCTION ME HAVE BEEN LOOKING FOR—A HIGH TENSILE STEEL WITH EXCEPTIONAL DUCTILITY— A HIGH TENSILE STEEL THAT CAN BE COLD FORMED READILY INTO DIFFICUL STAMPED OR PRESSED PARTS.

ITS INHERENTLY FINER GRAIN MAKES ALL THE DIFFERENCE

National Steel high tensile alloy was developed with one thought in mind—to provide a steel that not only has high tensile properties, *but in addition has that* DUCTILITY *which is absolutely essential in applications involving difficult cold forming operations*. This high tensile steel is daily demonstrating its superior ductility in a variety of difficult applications—new uses are being developed constantly—and everywhere engineers and production men are enthusiastic about its ability to solve their problems.

If you have a production problem that requires a high tensile steel with *exceptional workability*, our engineers will be glad to work with you in adapting this high tensile HIGH-DUCTILE steel to your special requirements. Inquiries are invited. National Steel high tensile alloy is available in sheets, strip, plates, bars and shapes.

NATIONAL · STEEL ·

GREAT LAKES STEEL CORPORATION · DETROIT, MICHIGAN

DISTRICT OFFICES: *Boston*, 1001 Statler Building; *Buffalo*, 1000 Walbridge Building; *Chattanooga*, Hamilton Bank Building; *Chicago*, 1026 Builders Building; *Cleveland*, 820 Leader Building; *Dayton*, 846 Third National Bank Building; *Indianapolis*, 1215-17 Circle Tower; *New York*, 405 Lexington Avenue; *Philadelphia*, 407 Liberty Trust Building; *St. Louis*, 3615 Olive Street; *San Francisco*, 824 Sharon Building; *Toledo*, 906 Edison Building.

DIVISION OF **NATIONAL STEEL CORPORATION**

READER Comments

Readers are invited to comment upon articles, editorials, reports, prices or other editorial material appearing in STEEL. The editors cannot publish unsigned communications, but at their discretion may permit a writer to use a pseudonym when a bona fide reason exists for withholding his identity. Letters should be brief—preferably not exceeding 250 words.

abricator on Pittsburgh Plus

o the Editor:

In the March 13 issue of STEEL ppeared an article regarding the nonopoly quiz" of the basing point ystem in which Prof. Frank A. Fet-r of Princeton university was uoted as stating that "the steel abricators have been treated as airly as they could by anyone." It ould be interesting to learn just hat this statement implies and hether or not it was made as the esult of an exhaustive investiga-on into this angle of the steel busi-ess.

Let us consider, for instance, the resent predicament of the numer-us fabricating shops throughout ie country which were organized nd grew up under the "Pittsburgh lus" system. Many of these plants ere located in small communities nd their competitive position ad-isted under this system, which roved entirely satisfactory.

When the federal trade commis-on in 1924 issued the now famous ease and desist" order against the Pittsburgh Plus" system and the ills established new basing points here the price was two to three ollars per ton above the price at ttsburgh, the welfare of these ops was not seriously affected, as e variation of base prices and brication in transit freight rivileges still permitted them to aintain their respective competi-ve positions.

In later years, when the mills in-gurated the delivered price sys-m of quoting the fabricators on eir requirements for each individ-l project, the cause of these plants as greatly encouraged, as they ere then enabled to compete on an ual basis over a large area. In some cases perhaps, this did not prove profitable to the mills, although had a limit been fixed upon these operations there is no doubt it would have worked out satisfactorily to all concerned.

Last summer these concerns were dealt a crushing blow when the mills discarded the delivered price system and established another, making the base price at all producing centers identical.

Under this system the fabricator located in a small community midway between two basing points finds himself facing a hopeless situation as his competitors at the producing points enjoy a distinct freight advantage over him, he being able to compete on an equal basis only in what might be termed his own back yard.

If this situation is to prevail, there is only one result to expect and that is eventual disappearance of these independent fabricators and ultimate centralization of this industry at the steel producing centers.

Is this the aim of the federal trade commission in its recent testimony before the temporary national economic committee?

Isn't it fair to surmise that in plunging into these problems bent only upon exposing unfair practices that this body has overlooked the welfare of the many small business concerns which thrived under the old system?

This nation under the "Pittsburgh Plus" system prospered as never before and this writer agrees whole heartedly with "STEEL" in its contention that the federal trade commission should stop its nonsense and address itself to the real problem of stimulating industry.

A FABRICATOR

Corry, Pa.

Improving Employe Relations

To the Editor:

Two interesting and significant trends in modern business were accented under "Labor" in STEEL, March 27, page 21. One was the value placed on the services of older employes, evidenced by the report of B. F. Goodrich Co., Akron, O., and the presentation of service medals to veteran employes of the American Steel & Wire Co.

This trend is becoming more marked each year, not only retention of older workers because of their greater experience and steadiness, but company pride in the fact a considerable number of employes have given such long service. It is visible proof of fair treatment and good working conditions.

The other trend was illustrated by the stories on International Harvester Co., Bridgeport Brass Co. and Johns-Manville Corp. making special reports to employes on financial operations. Explanation of the sources and disposition of the company dollar in a way to make it understandable to the average employe, is becoming fairly general and tends to improve employe relations.

The Bridgeport Brass Co. report did a good job in making it clear the owners of the company were a large number of small stockholders who had risked their cash to provide a place for employes to work. A significant feature of all these reports to employes is the fact that so much greater portion of the company dollar goes to labor than to stockholders. Workers have been prone in the past to believe they were getting the short end.

HENRY HOWARD

Chicago

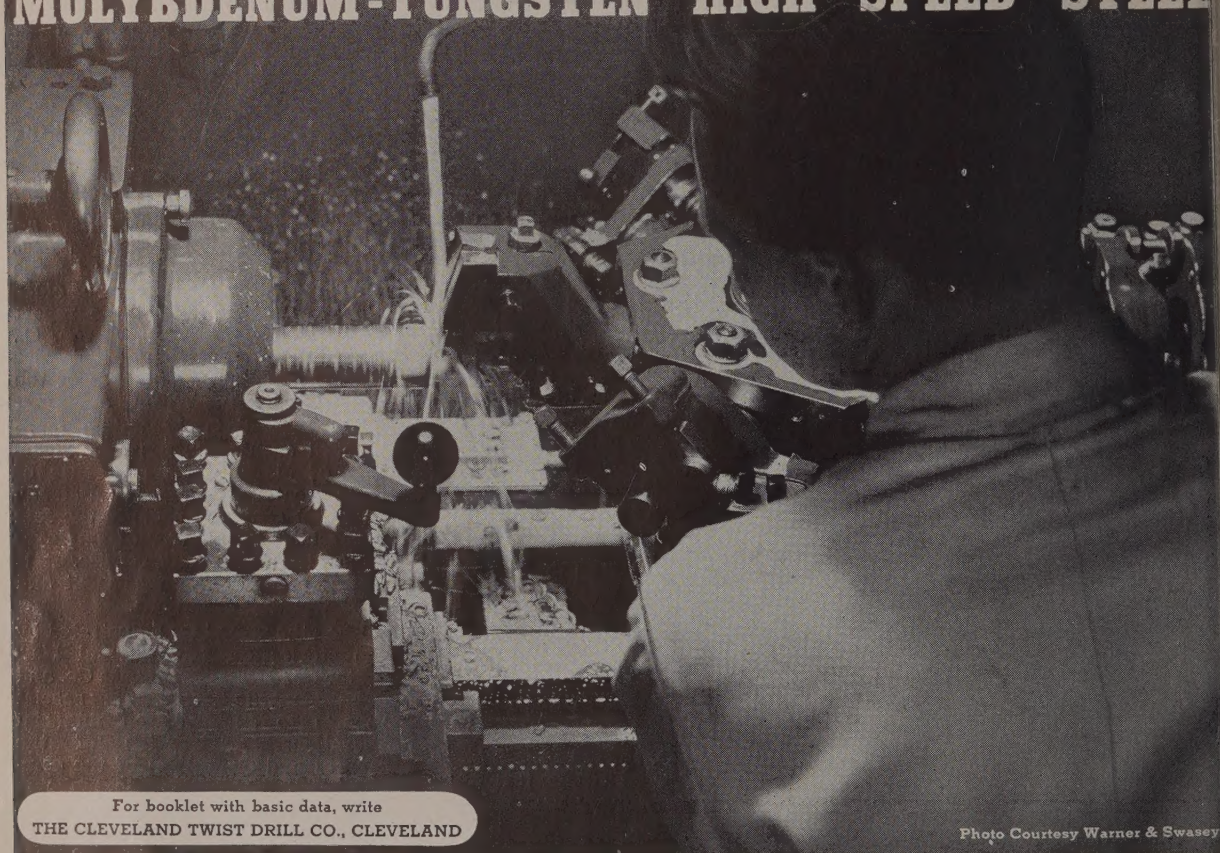
RESEARCH LIBRARY
WORKS PROGRESS ADMINISTRATION

for Quality and Quantity Production Shift to

MO-MAX*

TRADE MARK REG. U. S. PAT. OFF.

MOLYBDENUM-TUNGSTEN HIGH SPEED STEEL



For booklet with basic data, write
THE CLEVELAND TWIST DRILL CO., CLEVELAND

Photo Courtesy Warner & Swasey

MADE AND SOLD BY THESE LEADING STEEL COMPANIES UNDER THEIR TRADE NAMES

UNITED STATES

Allegheny Ludlum Steel Corporation
Bethlehem Steel Company
Braeburn Alloy Steel Corporation
Carpenter Steel Company
Crucible Steel Company of America
Henry Disston & Sons, Inc.
Halcomb Steel Division, Crucible Steel Company of America
Jessop Steel Company
Latrobe Electric Steel Company
Simonds Saw and Steel Company
Universal-Cyclops Steel Corporation
Vulcan Crucible Steel Company

CANADA

Atlas Steels Limited
Henry Disston & Sons, Inc.

GREAT BRITAIN

Atlas Steels Limited
Deutsche Edelstahlwerke A.-G.

FRANCE, GERMANY, ITALY, SWEDEN

Deutsche Edelstahlwerke A.-G.

* MO-MAX is a proprietary name owned and controlled by The Cleveland Twist Drill Company, and its only licensed use by others is on steel made and sold by licensees under patents owned or controlled by said Company.

EDITORIAL STAFF

E. L. Shaner
Editor-in-Chief

E. C. Kreutzberg
Editor

A. J. Hain
Managing Editor

E. F. Ross
Engineering Editor

Guy Hubbard
Machine Tool Editor

D. S. Cadot
Art Editor

ASSOCIATE EDITORS

H. H. Manlove — J. D. Knox
V. G. Gude — G. W. Birdsall
W. J. Campbell

New York
I. H. Such — B. K. Price
L. E. Browne

Pittsburgh
R. L. Hartford

Chicago
J. F. Powell

Detroit
A. H. Allen

Washington
L. M. Lamm

London
Vincent Delport

BUSINESS STAFF

G. O. Hays
Business Manager

C. H. Bailey
Advertising Service

New York . . E. W. Kreutzberg, B. C. Snell
Pittsburgh . . . S. H. Jasper
Chicago . . . L. C. Pelott, W. F. O'Dell
Cleveland . . . R. C. Jaenke, D. C. Kiefer

J. W. Zuber
Circulation Manager

MAIN OFFICE

Penton Building, Cleveland

BRANCH OFFICES

New York . . . 110 East 42nd St.
Chicago . . Peoples Gas Building
Pittsburgh . 1800 Koppers Building
Detroit . . 1010 Stephenson Building
Washington . National Press Building
Cincinnati . . . 282 Sinton Hotel
San Francisco . . 1100 Norwood Ave.
Oakland, Calif., Tel. Glencourt 7559
London . . . . Caxton House, Westminster, S.W. 1
Berlin . Berlin, N.W. 40, Roonstrasse 10

• • •

Published by The Penton Publishing Co., Penton Building, Cleveland, Ohio. John A. Penton, Chairman of Board; E. L. Shaner, President and Treasurer; J. R. Dawley and G. O. Hays, Vice Presidents; F. G. Steinebach, Secretary.

Member, Audit Bureau of Circulations; Associated Business Papers Inc., and National Publishers' Association.

Published every Monday. Subscription in the United States, Cuba, Mexico and Canada, one year $4, two years $6; European and foreign countries, one year $10. Single copies (current issues) 25c.

Entered as second class matter at the postoffice at Cleveland, under the Act of March 3, 1879.

Copyright 1939 by the Penton Publishing Co.

STEEL

ESTABLISHED 1882

Contents

Volume 104—No. 14 **April 3, 1939**

READER COMMENTS 9
AS THE EDITOR VIEWS THE NEWS 13
NEWS
- To Improve, or Not To Improve 15
- Germany Losing in Machinery Export Race 17
- Financial News of Steel Industry 18
- Labor News 18
- Steelworks Operations for Week 19
- Congress Acting on War Exports and Stocks 19
- March Pig Iron Production Up 4.9 Per Cent 20
- Southern Iron and Steelmaking Reviewed at Birmingham Meeting 21
- Men of Industry 22
- Obituaries 23
- Aviation 27
- Activities of Steel Users and Makers 27
- February Imports Off 27 Per Cent 32
- Meetings 32
- Seek To Increase Sales of Gas Fuel in Industrial Field 33

WINDOWS OF WASHINGTON 25
MIRRORS OF MOTORDOM 29
EDITORIAL—Businessmen Should Encourage Reform 34
THE BUSINESS TREND
- Activity Index Hovers Around Year's Peak 35
- Charts and Statistics 35-37

TECHNICAL
- Universal Fatigue Tester 38
- Descaling Made Fast Work with Multiple-flame Torch 46

PROGRESS IN STEELMAKING
- Insulating Firebrick 42

MATERIALS HANDLING
- Enamelware 48

JOINING AND WELDING
- Welded Barge 51

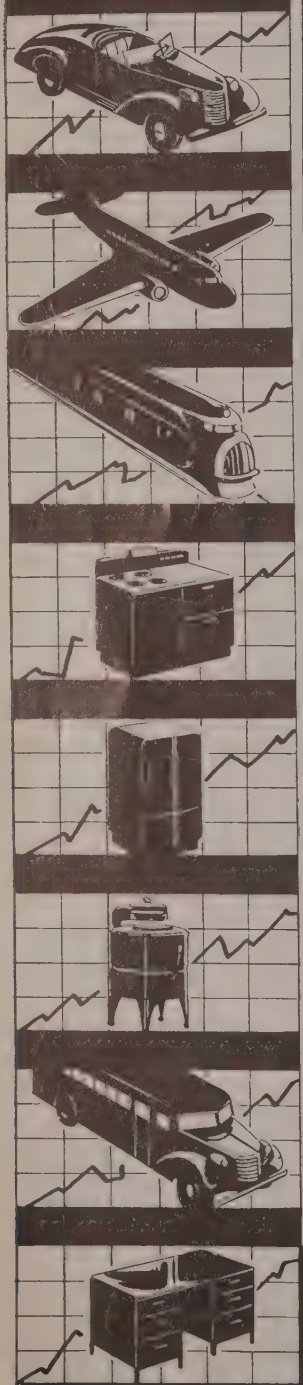
HEAT TREATING
- Controlled Work Hardening 56

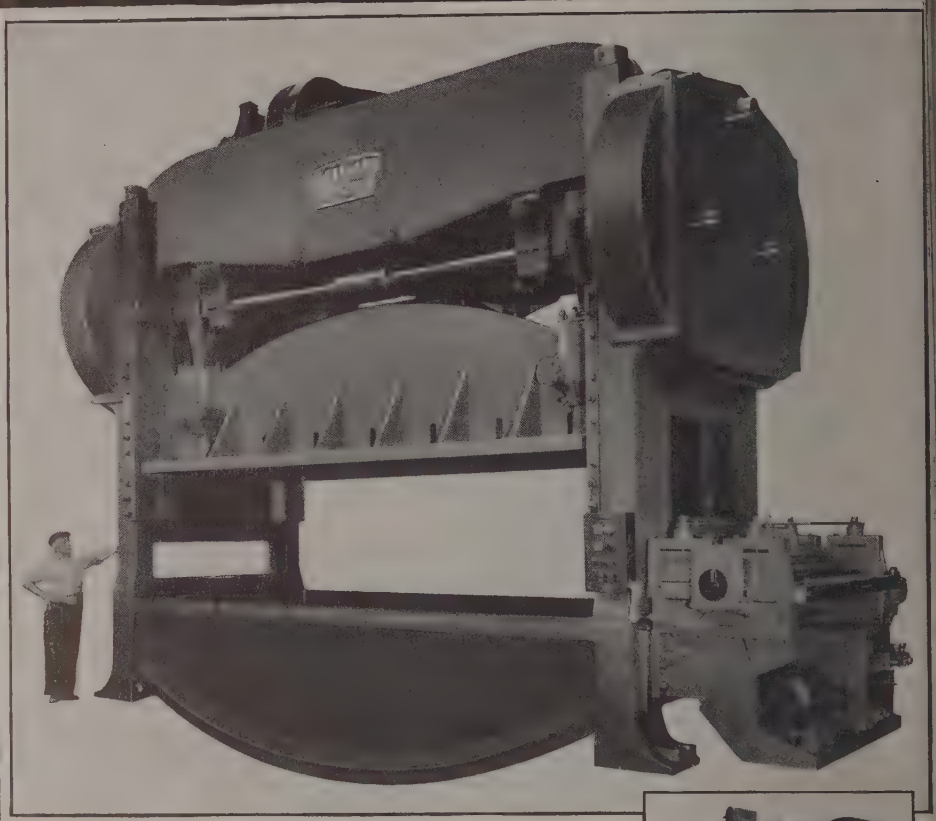
POWER DRIVES
- Mill Drive Problems 60
- Demand Charges Are Reduced 63

HELPFUL LITERATURE 61
INDUSTRIAL EQUIPMENT 66
MARKET REPORTS AND PRICES 69
- The Market Week 70

BEHIND THE SCENES 84
CONSTRUCTION AND ENTERPRISE 93
INDEX TO ADVERTISERS 116

PRODUCTION GETS A BOOST WHEN "CLEVELANDS" ARE INSTALLED





Cleveland Four Point Suspension Press with Automatic Roll Feed designed to feed from 6" to 180" of 72" material.

Clevelands are rugged, powerful Presses, capable of being operated up to their rated capacity at the highest possible speed. They give maximum output with minimum upkeep and last longer because they are designed and constructed by an organization which for 59 years has devoted all of its resources to the building of better Machines.

During recent years, many important refinements and improvements have been incorporated in the Cleveland line of Power Presses, refinements and improvements which are enabling pressed metal Manufacturers in Automotive, Electrical, Household Appliances, Office Furniture and many other lines of industry to speed up their production with a consequent reduction in costs.

Therefore, when your production needs a boost, it will pay you to investigate the possibilities of Cleveland Power Presses because Clevelands not only embody every modern feature for speed, accuracy and economy of operation but out of the twelve distinct types of Cleveland Presses, you will find a type and size to meet your particular requirements.

Cleveland No. 13 I Inclinable Press equipped with electrically controlled hydraulically operated friction clutch.

THE CLEVELAND PUNCH & SHEAR WORKS CO.

Cleveland, Ohio

TS
300

STEEL
PRODUCTION • PROCESSING • DISTRIBUTION • USE

As the Editor Views the News

STEEL'S survey of 74 companies which constitute a representative "sample" of the metalworking industry (p. 15) indicates that the average company has a plant improvement program entailing an outlay of approximately $100,000. Of this, $16,452 is to be spent immediately, while the remaining $83,696 is held up, mainly because of political uncertainties. Real encouragement of business by the government at this time, it is shown, would stimulate industrial activity and create more employment. . . . In the meantime, the volume of business is moving slightly downward. Steel production last week (p. 19) underwent another slight decline and now stands at 64.5 per cent of ingot capacity. Automobile production (p. 30) included 85,980 units, a drop of 3400.

• • •

Study Labor Act Revision

Hearings on proposed revisions to the Wagner labor relations act (p. 25) will start before the senate labor committee on April 11 and will continue for two or three weeks. Minimum steel wage order of the department of labor will not become effective until the appeal of eastern steelmakers is decided by the court of appeals of the District of Columbia. War department will oppose any drastic tax measure aimed at taking the profit out of war. A house resolution would authorize an investigation as to the extent to which the machine has displaced labor. . . . For the first time modern air conditioning, aimed at removing moisture and reducing coke consumption, is to be applied to a blast furnace, it was revealed (p. 21) at last week's meeting of the Association of Iron and Steel Engineers.

• • •

Wider Sheets Required

By new methods heat transfer occurs at speeds and uniformity greater than hitherto known, according to discussion (p. 33) at the American Gas association's industrial sales conference. A new boiler liquid vaporizes when heated and is more efficient than steam. Immersion tube heating makes boilers and water heaters 80 per cent efficient. . . . Newly developed for use in melting units (p. 33) are molybdenum briquets; they offer economy and convenience. . . . Hood tops on 1940 automobiles (p. 29) will require sheets up to 88 inches wide and a deeper drawing operation. Front fenders also will require deeper drawing. . . . Weirton Steel Co.'s new rolling capacity (p. 17) for structural shapes, piling and rails, is to be ready for operation in July. . . . Airplane orders (p. 27) continue heavy.

• • •

Testing Auto Parts

A new testing machine subjects automobile parts in a few hours to all the stresses and strains they would meet in years of ordinary use; it is described (p. 38) as "a million miles of rough road in a 10-foot box." . . . A new method of copperplating (p. 40) is claimed to be four times as fast as conventional methods. . . . Considerable confusion now exists with respect to specifications covering insulating firebrick; one authority (p. 42) discusses the various physical and chemical properties of such material in an attempt to clarify this situation. . . . A new magnet (p. 45) lifts 1500 times its own weight. . . . A road machinery builder had trouble because paint stripped off steel members soon after the machines were placed in service; he found a remedy in descaling with the oxyacetylene torch (p. 46) prior to painting.

• • •

Electricity Costs Cut

A kitchen utensil manufacturer (p. 48) has increased efficiency and output through installation of a new enameling furnace and relocation of equipment. . . . An authority (p. 51) describes a system of producing all-welded steel barges with a large proportion of the welds made in the downhand position. . . . A work hardening process which depends on the ability of austenitic manganese steel to harden under impact is said (p. 56) to have a wide range of application. . . . Through instrumentation, one user (p. 63) has been able to effect a material saving in demand charges for electrical current. . . . Newly developed equipment (p. 60) has permitted effective solution of a number of mill drive problems. . . . Painting of inside cylindrical surfaces is simplified (p. 67) by a new machine.

E C Kreutzberg

Are You Pegging for Bigger Profits?

Check the opportunities

You will want the greatest possible value for your dollars that go into steel. You will want the right steel for each purpose.

✓ For example many manufacturers are now obtaining 25% or more weight reduction without loss of structural strength by using Inland Hi-Steel.

✓ Others are adding 300% to 500% longer life when exposed to atmospheric corrosion by using Inland Copper-Alloy which costs but little more per ton than ordinary steel.

✓ Increasing numbers of shops are using Inland Ledloy, the new lead-bearing steel—which permits 30% to more than 100% increased machining speeds.

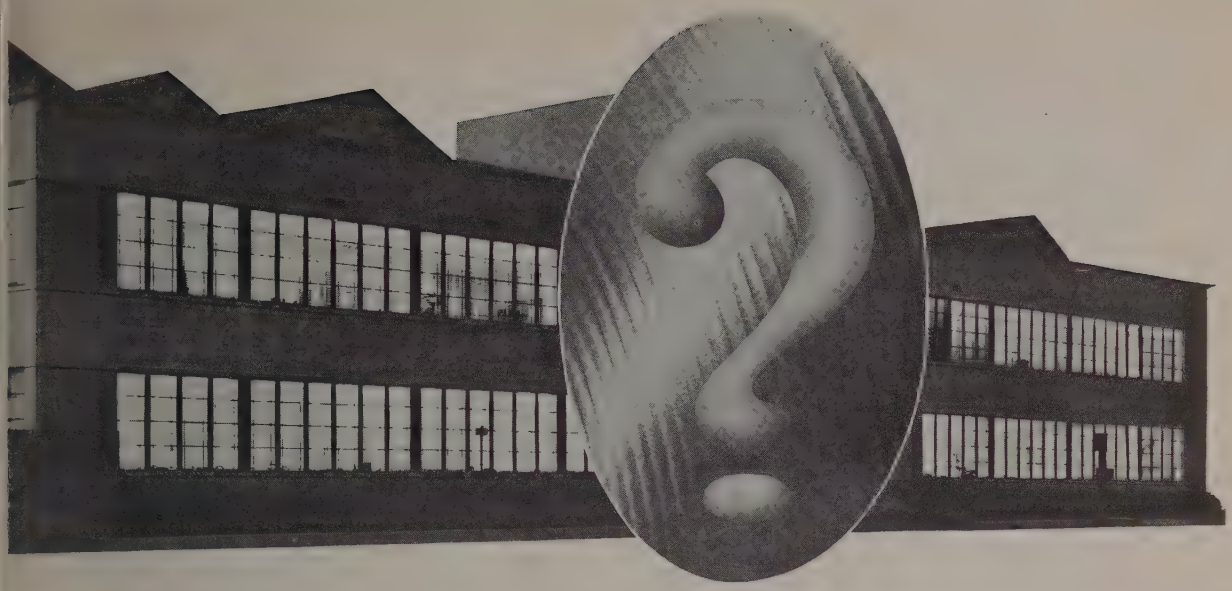
✓ If you use sheets or strip the right analysis combined with proper heat treatment, finish and uniformity will increase the speed to your forming operations.

Inland men will gladly check these economy possibilities with you. And their personal interest in serving you may result in some excellent methods of lifting your product-appeal or lowering your costs in order to peg profits higher during the coming year.

INLAND STEEL CO.

38 South Dearborn Street, CHICAGO • District Offices: DETROIT • KANSAS CITY • MILWAUKEE • ST. LOUIS • ST. PAUL

SHEETS STRIP TIN PLATE BARS PLATES FLOOR PLATES STRUCTURALS PILING RAILS TRACK ACCESSORIES REINFORCING BARS



To Improve, or Not To Improve—

Survey of 74 Metalworking Companies Indicates 51 Plan Expansion To Cost $7,411,000; Only Seven Going Ahead, with $1,217,500 —Political Uncertainties Cause Postponements

■ PLANT expansion and improvement programs are planned by 69 per cent of medium-size metalworking firms, representing every geographical section and a wide variety of products, covered in a survey by STEEL.

Many of these, however, are being held up, pending a more favorable administration attitude, improvement in the business outlook, easier financing, or more settled labor conditions.

Fifty-one of 74 companies said they have plans for improving manufacturing facilities. Of these, 42 said their programs are being postponed; seven are going ahead; one is postponing a part of its program.

Reasons cited by the 42 companies postponing planned programs:

Eighteen definitely expressed dissatisfaction with or fear of New Deal policies.

Seventeen are awaiting improvement in business.

Seven said they found financing difficult or are attempting to preserve their cash positions. Others mentioned labor uncertainties, new products yet in the development stage and fear of the foreign situation.

Twenty-three companies replied they have no plans for improving manufacturing facilities. Two of these have just completed or are completing programs which satisfactorily round out their plants. The others give various reasons for not expanding.

A Mid-Westerner says: "Drouth out here for eight years; and Wallace and Roosevelt on top of that!" Another: "Business is too periodical and must develop a more sustained demand before we can give it (expansion) serious consideration."

83.6 Per Cent Postponed

From Connecticut: "We haven't enough business to keep our present equipment busy." From the Mid-West: "Our present plant is sufficient." Still another: "Under existing circumstances we are not planning on any expansion." Others indicated they have "nothing unusual" or "nothing special" planned.

Total cost of the improvements planned by the 51 manufacturers is estimated by them at $7,411,000. The 42 programs being postponed represent $6,193,500, or 83.6 per cent of the total. Programs going ahead are estimated to cost $1,217,500, or 16.4 per cent of the total planned. Included in the programs being held up is one to cost $3,000,000, which is scheduled to go forward "as soon as conditions warrant."

Twenty-three of the 42 programs involve plant expansion; 37 contemplate additional or replacement machinery and equipment; 16 involve both plant expansion and new equipment.

Important increases in employment would result if the improvement programs were carried through. Only 14 of the 42 manufacturers said their programs would cause no increase. Others estimated employment gains from "slight" to 100 per cent.

Estimated employment increases:

Increase Per Cent	Companies
None	14
Less than 10	2
10 to 25	9
25 to 50	2
More than 50	7
Indefinite	13

Four others estimated they would add 15 to 150 workers each.

Thirteen of the contemplated programs would be at least partially for the purpose of manufacturing new products; 38 for producing the companies' present products.

The new products planned include power plant equipment, new lines of dairy plant equipment, aircraft parts, petroleum equipment, welded plate products, steel stampings, coal handling apparatus, farm implements, electric ranges and machine tools. Several others said they were

developing new products, but were not yet ready to announce them.

STEEL directed its questionnaire to the presidents of the 74 companies, the list being selected with a view to obtaining a representative "sample" of the metalworking industry.

Replies clearly indicate a vast amount of pent-up demand for improved manufacturing facilities.

One president declared: "We are postponing a $50,000 plant construction until we have a change of administration in Washington."

An easterner said: "Purchases withheld pending action of federal government in the matter of taxes, reduction of federal expenses and general attitude toward business."

From a Mid-Western agricultural center: "Lack of business; excessive taxation; governmental interference and restraint of legitimate business; the national labor relations board and its decisions; other unfair labor legislation."

Fears Foreign Policy

A Missourian writes: "Waiting on more favorable tax and labor laws." From the Atlantic seaboard: "Will not make capital expenditures while present policies are continued in Washington regarding labor and taxes; afraid of Roosevelt's foreign policy."

A $200,000 program is held up because "taxes are too high, and the Wagner labor act and other laws recently passed are not conducive to good business."

An Illinois company would buy a considerable amount of machinery and equipment were it not for "uncertainty about the future generally —in spite of Harry Hopkins."

An $85,000 plant is not being built now because of "taxation such as the undistributed profits tax, and the uncertainty of future government action as it affects real business recovery."

A $100,000 plant expansion has been "delayed, first awaiting repeal of undeclared profits tax, and later because of economic conditions."

Believes Outlook Brighter

An Ohioan plans to go ahead with a $40,000 equipment program but is awaiting "more settled political conditions at Washington," believes the situation is "very hopeful at present."

A Wisconsin manufacturer attacks the hours-wages law, the labor board, and tax laws. Minimum wages, he believes, are all right if applied also to co-operatives and equities. But "maximum hours is absolutely crazy. We try to keep our force employed all the law will allow. This allows no leeway for rush seasons . . . . We would have to have enough business instantly available to take double our present output to put on another shift. Tha is unreasonable."

The same executive believes the should be an exemption in both sta and federal tax laws allowing reasonable rate of interest on mone invested.

"The word profit is a misnome The first 5 or 6 per cent return on i vestment is not profit, but is mer ly interest on the investment. should not be taxed at all. Perso ally, I think the next 5 per cen should not be taxed if it is put int a reserve that will be drawn upo for interest on investment and em ployment during depression pe riods."

Insufficient volume of busines and uncertainty regarding the out look also is delaying a number o programs. A Philadelphian cite uncertainty as to level of busines "which we can expect in the imme diate and intermediate future, whic uncertainty is principally becaus our customers have the same uncer tainty."

A Virginia company is delaying plant expansion because of "insuffi cient volume of orders booke ahead. Unsettled labor conditions.'

Better Business by July 1

An Indiana company is delaying starting its improvements until July 1. "Expect business in general t be better by then."

Projected $32,000 equipment pro gram of a New York fabricator wil be partially carried out "very soon" and the balance before the end of the year.

Financing considerations are delaying other programs. A California concern has postponed building a new steel storage and handling shed because "we wish to build up our cash position first."

A Connecticut company cites: "Inability to borrow capital funds for periods over two months at 6 per cent interest, although triple security by means of real estate collateral is offered."

Another: "The financial situation in this locality for such improvements is out of the question; can get no help from local banks on account of their skepticism of business conditions."

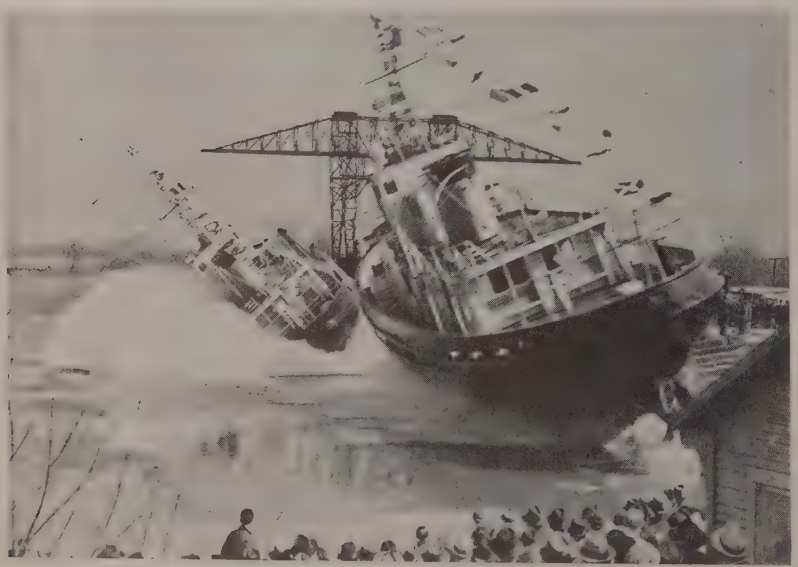
In summary: The 74 metalworking companies show a total of $7,411,000 in projected improvement programs. This indicates an average of slightly more than $100,000 per company.

The projects postponed average $83,696 per company.

The projects not being postponed average $16,452 per company.

For every dollar "going ahead" in investment for improvements to plant or equipment, five are stymied, due to uncertainties—chiefly political.

Welded-Steel Cutters in Twin Launching



■ **Two 110-foot United States coast guard harbor cutters, the Naugatuck and the Raritan, slide down the ways at the Bay City, Mich., yard of the Dafoe Boat & Motor Works. Assigned to service at Boston and Philadelphia, the welded steel hull ice breakers are powered with two 8-cylinder V-type General Motors 2-cycle diesel engines, have a speed of 12 knots, cruising range of 3600 miles. Shipbuilding March 1 reached the highest level in several years with 180 under construction; of these, 74 were ocean-going vessels, 105 miscellaneous steel ships**

ermany Loses in Machinery Export ace; Blames Shift in Russian Buying

GERMAN machines — especially achine tools—are at a disadvan-ge in competing for export mar-ts with American and British oducts, according to the German stitute for Business Research, rlin.

This realization, it says, is caus-g considerable concern in the eater reich. Germany needs ex-rt business. Last year machinery nstituted 17.9 per cent of all her ished goods exported.

While the reich's total machinery ports gained slightly — machine ol exports dropped—she did not are equally in the increased world port trade. How leading export-s shared in world machine trade lume:

ar	Germany	Great Britain	United States	Other Countries
		(Per Cent)		
29	28	20	32	20
36	27	26	28	19
37	26	23	31	20
38	23	23	33	21

Marked changes in destination of erman machine exports also are oted in the institute's current re-ort. Sharp decreases in exports to rtain countries have been offset y increased exports to others.

Most severe decline was in ship-ents to Russia, whose purchases German machines amounted to 3,000,000 reichsmarks in 1936, 72,-00,000 RM in 1937, but only 12,-90,000 RM in 1938. Total Russian achine imports are estimated to ave increased 20 per cent, and achine tool imports rose 50 per cent. Practically all these orders went to Anglo-Saxon builders. The institute blames this shift by Russia for Germany's failure to maintain her position in the world market.

German exports to Western Europe, North and Central America also dropped.

On the other hand, shipments to Danzig, Poland, the Baltic states and Finland increased 57 per cent. Export successes also were attained in Southeastern Europe; purchases by Rumania, Bulgaria, Greece, Yugoslavia and Turkey gained from 86,000,000 RM in 1937 to 104,000,000 RM in 1938. Gains also were made in the Far East, South America and South Africa.

Austria, Czechia Benefit Reich

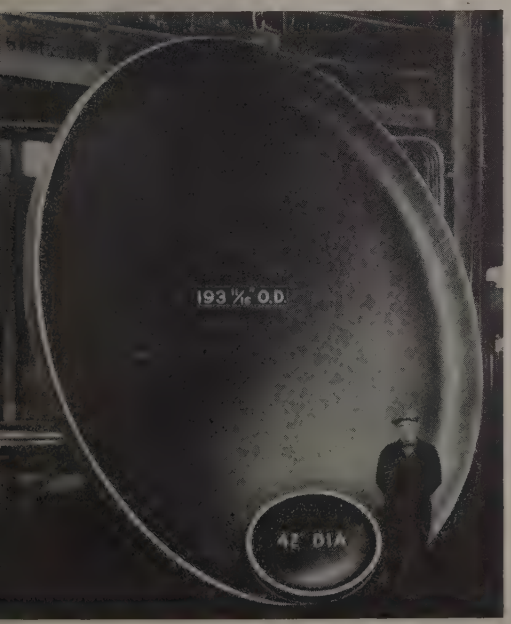
The institute points out the acquisition of Austria improved Germany's position, especially in the Southeastern European market. In Czechoslovakia she also gained machinery capacity.

The shift in German machine exports apparent in the past few years is likely to be intensified. Recent events indicate markets in which buying of German products already has dwindled may become even more difficult for Nazi exporters. Some markets in which Germany has been more successful probably will continue to accept the Nazi barter system; Japan, for instance, and possibly Southeastern European and American and British trade campaigns in South America promise Germany keen competition in that large market.

Russia is unlikely to shift back to Germany; nor is Western Europe. Significantly, the British trade commission canceled its trade conference with Germany and proceeded to Moscow.

That the German institute should find German machine tools at a disadvantage in export markets will cause no particular surprise to American machine tool builders. They generally agree German tools rate third in quality, with American tools first and British second. Although German workmanship and design are of high quality, the Nazis' strict economy of metals has resulted in a sacrifice in ruggedness.

To compensate, the Germans have, in the past few years at least, given preference to export orders. Prices for German tools have been considerably lower than prices for comparable American tools. But despite higher prices, United States' share in 1938 world machine exports exceeded its 1929 portion, as shown by the institute's tabulation.



Flanged Head 16 Feet O.D.

■ Exceptionally large is this flanged and dished head recently turned out by Worth Steel Co., Claymont, Del. Outside diameter is 193 1/16 inches; it has a 3-inch straight flange, 11½-inch knuckle radius, is 27/32-inch gage, required a 220-inch blank

Weirton To Complete Expansion by July

■ Weirton Steel Co.'s enlarged rolling mill facilities at Weirton, W. Va., will be completed and ready for operation by July. The expansion, costing $5,000,000, will permit rolling a wider range of structural shapes, piling and rails. A feature will be its capacity to roll 180-pound rails.

Shapes to be rolled include angles from 1 x 1 x ⅛-inch up to and including 8 x 8 x 1⅛ inches; I-beams from 3 to 24 inches; H-beams, 4 to 8 inches; wide flange beams with flange widths up to 8¼ inches, depths of sections running to 21 inches; standard channels from 3 to 18 inches; car and ship building channels 3 to 13 inches; car center sills in all sections; car and shipbuilding bulb angles from 4 x 3½ inches to 10 x 3½ inches; rolled tees from 2⅜ x 2½ to 6½ x 6½ inches; slit tees within the range of beam sections; zees from 3 to 6 inches; and special sections within the range of the mill. Sheet piling in standard and special sections will also be rolled.

Bar Mill Rates Steady

■ Wage rates in bar mills represented in the Western Bar Iron association, having contracts with the Amalgamated Association of Iron, Steel and Tin Workers, will remain unchanged through April. The rates have been constant since July, 1938.

FINANCIAL

ARMCO NET LOSS $1,307,880 AT 41 PER CENT OPERATIONS

■ AMERICAN ROLLING MILL CO., Middletown, O., reports a $1,307,880 net loss for 1938, after all charges. In 1937, company's net profit was $8,231,334.

Consolidated net sales in 1938 totaled $70,441,606, a decrease of 39 per cent from 1937. Shipments ranged from 29 per cent of capacity in January to almost 60 per cent in December. Monthly average shipments for the year were 41 per cent of capacity.

Chairman George M. Verity and President Charles R. Hook in their message to stockholders stated: "The drastic decline in industrial activity resulted in such low percentage of operations over such a substantial period that, with the constant attack on steel prices by many uninformed persons and with the natural competitive situation, it ultimately resulted in a breaking down of price structures throughout the entire iron and steel industry.

"The new year began with many influences making for upward trends in general business activity. The constant threat of war in Europe and continued political conflict and dissension in this country have created definite retarding influences."

Company's consolidated tax bill for the year was $2,453,506, equal to $2.76 per ton of shipments, or $168.26 for each of the average number of employes.

For new buildings, equipment and other facilities, the company spent $4,803,304. The plant modernization program, taking advantage of slack operations, was carried forward with minimum interference to operating schedules and at reasonable costs.

Cold mill finishing capacity at Middletown was almost doubled with installation of additional warehousing and processing facilities. Coke ovens at Hamilton, O., were increased 33 1/3 per cent; efficiency of Butler, Pa., plant was stepped up; a new sheet mill at Port Kembla, Australia, jointly owned by Armco International Corp. and an English company, started operations in January.

About $3,200,000 of funds earmarked for improvements remains to be expended. Continuous hot mill at Middletown will be rebuilt this summer.

Number of employes on payroll declined from 16,204 on Dec. 31, 1937, to 14,295 on Dec. 31, 1938. Pay rolls fell from $33,769,160 to $23,747,729 in 1938. Hourly wages were unchanged; salaries were reduced 16 per cent during the year.

Commenting on the case brought against the Ashland, Ky., plant by the national labor relations board, the statement says:

"Hearings on that case are now in their tenth month. Direct costs of litigation are already in excess of $100,000. The stenographic record of these proceedings on March 15, 1939, filled 18,534 pages in 120 volumes. The cost of this record alone is $1.10 per page.

"In the light of Armco's unbroken record over a period of 39 years of co-operation and understanding between management and men, this experience demonstrates the need for revision of laws which unnecessarily impose such expenses on business."

INLAND STEEL

Inland Steel Co., Chicago, reports a net profit of $4,916,203, equal to $3.12 per share on 1,577,005 shares of stock outstanding, for 1938. This represents a sharp reduction from the net income of $12,665,317, or $8.05 per share on 1,573,950 shares, for 1937. Ingot operations last year averaged 54 per cent, against 74.8 in 1937. Net sales, $74,058,924, represented a decline of 33 per cent from the 1937 total, $110,744,037. Allowance for taxes in 1938 was estimated at $3,249,814, equivalent to $2.06 per share on the outstanding capital stock.

OTIS STEEL

Otis Steel Co., Cleveland, reports net loss of $1,230,296 for 1938, after depreciation amounting to $1,080,555 and after repairs, maintenance and renewal expense of $1,153,594. The company's statement showed current assets of $9,950,907 against current liabilities of $1,696,576. Capital expenditures last year amounted to $1,170,173. During 1937 the company had a net profit of $2,320,031, equal to $1.71 a share on common stock.

ALLEGHENY LUDLUM

Allegheny Ludlum Steel Corp., Pittsburgh, had a net loss of $1,070,186 in 1938, after all deductions including $1,068,760 for depreciation. In the preceding year the two companies composing the corporation operated independently. Allegheny Steel Co. reported for 1937 a net income of $1,813,707, after all deductions, equal to $2.10 a common share. Ludlum Steel Co. had a net profit of $1,120,422 in 1937, equal to $2.25 per share on common stock. Allegheny Ludlum recorded a net profit in the fourth quarter of 1938, and it is estimated a profit also was made during the first three months of 1939.

♦

Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., had net income of $589,645 in 1938, equal after d idends on 6 per cent preferred sto to $2.31 a share on 99,318 shares common stock, excluding 682 tre ury shares. This compares with $ 471,827, or $11.19 a common share 1937.

♦

Acme Steel Co., Chicago, repor net profit of $368,168 for 1938. Th is equal to $1.12 a share on capit stock, and compares with a net i come of $1,898,091, or $5.78 a shar for 1937.

DIVIDENDS DECLARED

Manning, Maxwell & Moore In New York, for first quarter, 12 cents on common, payable April to record March 31. The last pr vious dividend was paid July 1938, also 12½ cents a share.

Detroit Gasket & Mfg. Co., D troit, 25 cents on common, payab April 20. Similar payment wa made Dec. 20.

Superheater Co., New York, 12 cents on common, payable April 1

Link-Belt Co., Chicago, regula quarterly dividend of 25 cents c common payable June 1.

LABOR

NATIONAL TELLS EMPLOYES STORY OF 1938 BUSINESS

■ NATIONAL STEEL CORP. ha explained to employes "The Stor of Our Business in 1938" in a 4-pag illustrated pamphlet, taken from th annual report to stockholders. In cluded are a simplified balance shee payroll, earnings and sales statis tics.

Sales for the year totaled $89 503,232, a decrease of 39 per cen from 1937. Taxes required $5,162 695, 5.77 per cent of the total, o $293 for each employe. Wages con sumed $27,608,885, or 30.85 per cen of sales; materials cost $50,070,000 or 55.94 per cent; dividends took $2, 168,532, or 2.42 per cent; $4,493,12 was laid aside for contingencies and plant improvements.

Profit in 1938 was $6,661,652, o 63 per cent less than in 1937. Total payrolls dropped 29.7 per cent, from $39,254,007 to $27,608,885. Wage rates were not reduced but de creased production caused less work.

Under "Facts Worth Knowing," the company lists:

"The steel industry as a whole sold about 50 per cent less in 1938 than in 1937. We sold 39 per cent less.

"While our total payrolls were 29.7 per cent less, payrolls in the entire industry fell 37.2 per cent from 1937 to 1938.

"Each employe's job represented in 1938 an original investment of

2,137.32 for raw materials, mills, ildings, machinery and equip-ent. In other words, somebody it up more than $12,000 behind ch one of us for buildings, tools, id equipment with which we earn ir living.

"In 1938, National Steel received per cent fewer sales dollars than 1937, but out of each $100 col-cted from customers in 1938, wages ok 14.7 per cent more than in 1937, hile stockholders received 53.5 per nt less."

FEEL EMPLOYMENT IS IGHEST IN 11 MONTHS

February steel industry employ-ent at 453,000 was the highest nce February, 1938, according to ie American Iron and Steel insti-ite. The total compares with 451,-00 in January and 461,000 in Feb-uary last year.

Reflecting a short month, Febru-ry payrolls of $57,044,000 were be-ow the January total of $59,348,000, ut 25 per cent over February, 1938.

Last month wage earners averaged 2.7 cents an hour and worked an verage of 33.5 hours a week.

OURT HOLDS "LITTLE NEW EAL" "GROSSLY UNFAIR"

By unanimous decision Pennsyl-ania's supreme court last week eld unconstitutional four sections f the state's 1937 compensation act, nown as former Governor Earle's Little New Deal." An important eature was an increase in mini-num compensation from $7 to $12 veekly, and maximum from $15 o $18.

The court found four provisions grossly unfair" to employers, tending to drive out industry."

The four sections voided provided hat: Employers were responsible or compensation of employes of ubcontractors, whether injured on ie employer's premises or not; the mployer is "presumed" guilty of egligence because an employe is njured, and that remarks of an in-ured employe within 12 hours after he accident may be admitted as ompetent evidence; an employe is ntitled to compensation for injuries n the course of employment, even hough the result of violating a law, regulation of the industry or an mployer's order; existence of an ccupational disease or proof that workman had been submitted to physical examination and been ismissed within a year constitutes *rima-facie* evidence of employer egligence.

The court indicated that reason-bleness of compensation rates would be tested by comparison with vages earned before the injury, it eing unreasonable to pay compen-ation higher than normal earnings.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended April 1	Change	Same week 1938	Same week 1937
Pittsburgh ...	49	+ 1	32	95
Chicago	53.5	— 3	32.5	84
Eastern Pa...	40	None	29	59.5
Youngstown..	50	— 4	30	86
Wheeling	66	+ 3	41	96
Cleveland ...	52.5	None	33.5	79.5
Buffalo	42	+ 4.5	30	89
Birmingham..	62	—16	66	80
New England	50	—15	20	85
Cincinnati ...	51	— 4	18	80
St. Louis.....	43	—14.5	46.5	82
Detroit	74	+ 2	18	100
Average....	54.5	— 1	36	91.5

PRODUCTION

■ STEELWORKS operations last week declined 1 point to 54.5 per cent, with reductions in six districts and gains in four. A year ago the rate was 36 per cent; two years ago 91.5 per cent.

Youngstown, O.—Receded 4 points to 50 per cent, with three bessemers and 42 open hearths active. Four open hearths were taken off, but two were added late in the week. Schedules for this week indicate a rise of 1 point to 51 per cent.

Cleveland—Unchanged at 52.5 per cent. An increase by one mill is expected this week.

Detroit—Up 2 points to 74 per cent, 18 of 26 furnaces operating.

Chicago—Down 3 points to 53.5 per cent, following curtailment by a leading interest and an independent.

St. Louis—Dropped 14.5 points to 43 per cent, as three producers reduced production.

Cincinnati—Off 4 points to 51 per cent, after remaining close to 55 per cent for several weeks.

Pittsburgh—Slight increases by important producers caused an advance of 1 point to 49 per cent.

Wheeling — Increased bessemer production moved the rate up 3 points to 66 per cent.

Central eastern seaboard—Held at 40 per cent for the fourth consecutive week.

New England—Receded 15 points to 50 per cent as important producers reduced output.

Birmingham, Ala.—Removal of two open hearths each by two leading producers caused the rate to fall 16 points to 62 per cent.

Buffalo—Lighting of two additional open hearths by Bethlehem Steel Co. lifted the rate 4.5 points to 42 per cent, the highest in two months, a rise of 10 points in three weeks.

Action on War Exports, Stocks

WASHINGTON

■ NEUTRALITY legislation and acquisition of strategic and critical mineral stockpiles held congress' attention last week. Representative Hamilton Fish, New York, offered in the house a new neutrality bill prohibiting sale and shipment of arms and ammunition to belligerents. For the "cash and carry" provisions of the present bill, expiring in May, Fish provided American ships may carry such materials as scrap iron and steel to belligerents at shipowners' risk.

Representative Coffee, Washington, introduced a bill in the house to prohibit exports of arms, ammunition, scrap iron and steel, scrap tin and other metal products.

These bills followed reports the President had asked legislative leaders to either repeal or drastically modify the present law.

The senate on Friday passed a bill providing for the acquisition of strategic mineral stockpiles, but authorized expenditure of only $40,000,000 for this purpose instead of the $100,000,000 originally provided.

Still pending in the house is a similar bill, favorably reported by the house military affairs committee (STEEL, March 27, p. 26). The military affairs committee reported it considered the problem from two angles: First, solely as a national defense measure; second, as a measure to develop our national resources of strategic raw materials.

Stockpiles recommended by the committee: Manganese ore, 554,000 long tons; chrome ore, 250,000 long tons; tungsten ore, 2250 short tons; tin 85,000 short tons.

Adjusting Wage Rates At Pittsburgh Steel

■ Negotiations between Pittsburgh Steel Co. and the Steel Workers Organizing committee were in progress last week to adjust tonnage rates for some workers in the company's open-hearth department where mechanical improvements have increased output 60 to 70 per cent. Company spokesman stated the reduction will amount to between 10 and 15 per cent of wages affected.

Since their rates have been increased substantially by reason of the increased production the actual pay will not go below levels accepted by the union at the time the contract was signed in the spring of 1938. Negotiations are under section 11 of the contract, which permits adjustment in rates.

March Pig Iron Production Up 4.9 Per Cent; Two Stacks Added

■ PRODUCTION of coke pig iron in the United States continued the upward trend started in February, showing a daily average output in March of 77,182 gross tons, an increase of 3604 tons, or 4.9 per cent, over the average 73,578 tons in February. This was the highest daily rate since October, 1937, with 93,259 tons. In March, last year daily output averaged 47,426 tons.

Total production in March was 2,392,629 gross tons, higher by 332,446 tons, or 16.2 per cent, than the February total 2,060,183 tons, and the largest monthly output since October, 1937, when 2,891,026 tons were produced. In March, 1938, production was 1,470,211 tons.

MONTHLY IRON PRODUCTION

Gross Tons

	1939	1938	1937
Jan.	2,175,423	1,444,862	3,219,741
Feb.	2,060,183	1,306,333	3,020,006
March	2,392,629	1,470,211	3,470,470
Tot. 3 mo.	6,628,215	4,221,406	9,710,217
April	.....	1,388,008	3,400,636
May	.....	1,260,937	3,545,180
June	.....	1,060,747	3,115,302
July	.....	1,213,076	3,501,359
Aug.	.....	1,495,514	3,616,954
Sept.	.....	1,683,097	3,417,960
Oct.	.....	2,067,499	2,891,026
Nov.	.....	2,286,661	2,007,031
Dec.	.....	2,212,718	1,503,474
Total	.....	18,889,663	36,709,139

Output for the first three months of 1939 aggregated 6,628,215 tons, an increase of 2,406,809 tons, or 57 per cent, compared with corresponding period in 1938 when 4,221,406 tons were made. Output for first three months of 1937 totaled 9,710,217 tons.

Relating production to capacity, operations in March averaged 56 per cent. This is the highest since January, 1937, with 76.6 per cent, and compares with 53.5 for February and 51 in January. High point in 1938 was in November with 55 per cent.

Number of stacks in blast March 31 was 123, a net gain of two. Four steelworks or nonmerchant stacks resumed and two were blown out or banked. In the merchant list, the two added were counterbalanced by two taken out. The March total of 123 compared with 115 in January, and 90 in March, 1938. The March, 1939 figure was highest since October, 1937, when 151 were in blast.

Furnaces resuming during March were: In Indiana: Gary No. 4, Carnegie-Illinois Steel Corp. In Ohio: River No. 1 and Youngstown No. 2, Republic Steel Corp.; Hubbard, O. No. 1, Youngstown Sheet & Tube Co. In Pennsylvania: Neville Island, Pittsburgh Coke & Iron Co.; Monongahela No. 2, National Tube Co.

AVERAGE DAILY PRODUCTION

Gross Tons

	1939	1938	1937	1936
Jan.	70,175	46,608	103,863	65,461
Feb.	73,578	46,655	107,857	63,411
March	77,182	47,426	111,951	66,004
April	.....	46,267	113,354	80,316
May	.....	40,675	114,360	85,795
June	.....	35,358	103,843	86,551
July	.....	39,131	112,947	83,735
Aug.	.....	48,242	116,676	87,475
Sept.	.....	56,103	113,932	90,942
Oct.	.....	66,694	93,259	96,509
Nov.	.....	76,222	66,901	98,331
Dec.	.....	71,378	48,499	100,813
Ave.	73,647	51,752	100,573	83,832

Stacks blown out or banked were: In Alabama: Ensley No. 1, Tennessee Coal, Iron & R. R. Co. In New York: Standish, Chateaugay Coal & Iron Co. In Ohio: Steubenville No. 1, Wheeling Steel Corp. In Pennsylvania: Shenango, Shenango Furnace Co.

Tin Output Reduced

■ World tin production in January totaled 15,900 gross tons, compared with 9300 tons in December and 13,900 tons in January, 1938, according to International Tin Research and Development council.

For 12 months ending January, 1939, world output was 150,000 tons, 27 per cent less than 207,700 tons in the preceding 12.

World apparent tin consumption in January was 11,300 tons, the same as in December. In January, 1938, consumption amounted to 13,000 tons. For 12 months ended January, 1939, the amount was 149,000 tons, 24 per cent less than 196,000 tons in the preceding period.

World tin plate production in January was 270,000 tons, compared with 250,000 tons in December, and 241,000 tons in January, 1938.

MARCH IRON PRODUCTION

	No. in blast last day of Mar.	Feb.	Total tonnage Merchant	Nonmerchant
Alabama	14	15	73,936	159,270
Illinois	9	9	33,925	181,121
New York	8	9	44,505	91,888
Ohio	30	28	68,094	491,164
Penna.	35	34	28,333*	639,506*
Colorado	2	2		
Indiana	10	9	6,498*	395,797
Maryland	4	4		
Virginia	1	1		
Kentucky	1	1		
Mass.	0	0		
Michigan	4	4		
Minnesota	1	1	6,428	172,164
Missouri	0	0		
Tenn.	0	0		
Utah	1	1		
West Va.	3	3		
Total	123	121	261,719	2,130,910

*Includes ferro and spiegeleisen.

February Farm Tool Exports Decline 41%

■ Farm equipment exports in February totaled $3,870,645, a decline of 41 per cent from $6,602,373 in February, 1938, with all major types sharing in the reduction, states

RATE OF OPERATION

(Relation of Production to Capacity

	1939[1]	1938[2]	1937[3]	19
Jan.	51.0	33.6	76.6	4
Feb.	53.5	33.6	79.5	4
March	56.0	34.2	82.5	4
April	....	33.4	83.7	5
May	....	29.4	84.3	6
June	....	25.5	76.6	6
July	....	28.2	82.9	6
Aug.	....	34.8	85.7	6
Sept.	....	40.5	83.7	6
Oct.	....	48.0	68.4	7
Nov.	....	55.0	49.3	7
Dec.	....	51.4	35.6	7

[1] Based on capacity of 50,198,920 gr tons, Dec. 31, 1938; [2] capacity of 50,606, gross tons, Dec. 31, 1937; [3] first half capacity of 49,512,737 tons, Dec. 31, 1 —second half on capacity of 49,727, tons, June 30, 1937; [4] capacity of 49,7 893 tons, Dec. 31, 1935. Capacities American Iron and Steel Institute.

machinery division, department commerce.

Tractors and parts showed a l of 46 per cent, $2,725,056 compa with $5,050,049 a year ago. Tilla implements dropped 32 per cent a harvesting machinery 31 per ce Seed separators gained 83 per ce from $26,779 a year ago to $49,(in February.

Features Alloy Steels

■ Allegheny Ludlum Steel Cor Pittsburgh, has introduced a n house publication, *Steel Horizo* "a preview of steels of today a tomorrow." Devoted especially stainless and other alloy steels, t magazine will be published s times a year.

First issue describes the co pany's development of special stee uses and outstanding fabricatio made of the company's stainless.

uthern Iron and Steelmaking viewed at Birmingham Meeting

BIRMINGHAM, ALA.

OINCIDENTAL with the annual ng conference of the Associa- of Iron and Steel Engineers at Hotel Tutwiler here, March 8, is the fact that 20 years ago Birmingham section of the as- ation was founded. On March 1919, the late John Kelley Sr., rles Mink and A. H. Schwartz t in this city and arranged for first meeting which was held one nth later.

ast week the association held its t national meeting in Birming- n with over 500 in attendance. lowing the technical session Mon- , at which three papers were sented, members and guests met lunch and then were taken by es to the plant of the American st Iron Pipe Co.

H. A. Travers, power assistant en- eer, Westinghouse Electric & g. Co., East Pittsburgh, Pa., whose per on "Relay Protective Meth- s for Steel Mill Service," was pre- nted by G. E. Stoltz of the same mpany, reviewed the several haz- ds to which mill motors are sub- ted and cited means of protec- n. He pointed out that certain normal conditions develop rapidly the case of short circuiting and ged that the electrical unit should isolated from the system. Syn- onous motors under such condi- ns reverse their action and func- tion as generators. He presented a diagram to show how current back- flow is handled by a differential sys- tem.

Overheated bearings on motor units are now common practice. A temperature relay often is employed on bearings to sound an alarm when the temperature exceeds the normal operating rate. Unless the attend- ant is able to cool the bearing, the machine is tripped off the line, he explained. Undervoltage protec- tion frequently is provided by a volt- age transformer on the motor or bus. The speaker favored a time re- lay rather than one of the instan- taneous type. The speaker referred to the trend to equip sheet mill equipment with lightening arrestors.

Speed Stepped Up

Frank Cramer, electrical engineer, Carnegie-Illinois Steel Corp., Pitts- burgh, in discussing this paper, stated that synchronous motors have changed since the development of the wide strip mills. Today, the speed has been stepped up to 2000 feet per minute. Grounding, he stated, seems to be an indetermin- ate quantity. He drew attention to the fact that because of the many gadgets added to electric equipment a new type of motor inspector is re- quired at the mill.

Of a total of 2,000,000 tons of wire produced in this country annually, about 475,000 tons went into nails, 7500 tons into coat hangers, and 23,000 into fly screens. This fact was brought out by J. J. Phifer, super- intendent Fairfield Wire Works, Tennessee Coal, Iron & Railroad Co.

The art of drawing wire has un- dergone little change, the speaker stated, but since 1920 many weak- nesses in the machines have been eliminated. Many attempts have been made to insert a clutch in the drawing block in order to avoid abrupt starting but with little or no success. Improvement in continu- ous wire drawing equipment was more rapid in copper than in steel, he stated, because the early designs were based on the principle of slip- page which could be tolerated in the wet-drawing process used in copper than in the dry process practiced in steel.

He drew attention to individual wire drawing blocks driven by a single motor as having a wider size range and greater adjustability. The speed of these units is set by a hand rheostat while back tension is pro- vided by springs in the frames. Slippage is reduced to a minimum. Double-deck blocks, the speaker pointed out, frequently are pro- vided with a spindle for extra passes. In his opinion, it is best to use a double-deck block for the first draft.

Closer Tolerances

Machines now are available for drawing low-carbon wire from 1000 to 1500 feet per minute. He empha- sized the advantage of using tung- sten carbide dies and cited one in- stance where 30,000 pounds of wire was drawn through a die of this type with the start and finish of the wire well beyond the tolerance. The trend is toward higher speed in drawing heavier bundles, closer tolerances and better lubrication. The speaker mentioned proper roll- ing, cleaning and coating, as con- tributory to successful wire draw- ing. He credited steelmakers for many of the advances in wire draw- ing practices in supplying workable material.

Lubrication in the steel mill is the most difficult of all fields, ac- cording to William Mandy, The Texas Co., Birmingham, Ala. Due consideration to the efficiency of lubricants requires the proper appli- cation, he stated. It depends on the location of the mill and the type and age of the mill. Mills located near a source of cool water have the advantage over mills depending on reclaimed water for cooling pur- poses. Where cold water is not available, he stated, high-melting point lubricants are required.

High-grade engine oil is not rec- ommended for worn line shaft bearings. In modern mills a high- quality lubricating product should

(*Please turn to Page* 64)

Iron and steel engineers meeting in Birmingham, Ala., last week were welcomed Robert Gregg, president, Tennessee Coal, Iron & Railroad Co. Left to right: Mr. egg, C. C. Wales, president, Association of Iron and Steel Engineers; A. H. nwartz, one of the founders of the association's Birmingham chapter; Karl Land- be, vice president, Tennessee company, and Charles Bradford, district manager, Republic Steel Corp.

MEN OF INDUSTRY

■ ALEXANDER E. WALKER, executive vice president, Pittsburgh Steel Co., Pittsburgh, since Jan. 1, 1937, has resigned to become vice president and a director, National Supply Co., Pittsburgh.

Before joining Pittsburgh Steel, Mr. Walker was general manager of sales, Republic Steel Corp., Cleveland, and also was president of Truscon Steel Co., Youngstown, O., a Republic subsidiary. Mr. Walker has been identified with the steel industry since graduation from the University of Michigan in 1910. He joined LaBelle Iron Works, Steubenville, O., now a part of Wheeling Steel Corp. in 1911, and later was assigned to the company's Chicago sales office. In February, 1916, he joined Republic as assistant manager of pipe sales; in 1919 was named assistant general manager of sales, and in 1928 general manager of sales. Mr. Walker became president of Truscon in 1936.

♦

G. H. Newton, president, Graver Tank & Mfg. Corp., East Chicago, Ind., is again at work after a serious operation and several weeks recuperating in Miami, Fla.

♦

Andrew M. Kennedy, vice president, Pittsburgh Coke & Iron Co., Pittsburgh, has been elected a director, Sharon Steel Corp., Sharon, Pa., replacing John M. Wilson.

♦

H. Edward Manville has been appointed chairman of the board, Johns-Manville Corp., New York. He succeeds the late William R. Seigle.

♦

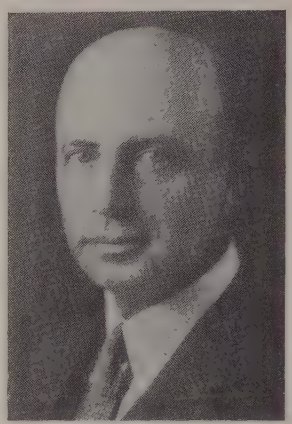
Edward W. Hill, assistant superintendent, open-hearth deartment, Duquesne works, has been transferred to the Clairton, Pa., plant of Carnegie-Illinois Steel Corp., as superintendent of open hearths.

♦

William Burwell, Joseph Couden, George Crabbs, Robert Hazlett, Isaac M. Scott, all of Wheeling, W. Va., and Crispin Oglebay, of Cleveland, have been re-elected directors, Wheeling Steel Corp., Wheeling, W. Va.

♦

Ervin J. Sanne has been appointed assistant manager of sales, sheet and strip steel division of the sales department, Inland Steel Co., Chicago, effective May 1. He has been district sales manager of Inland at St. Paul since 1936, and prior to that time was associated with Joseph T. Ryerson & Son Inc., now a subsidiary of Inland. He joined Ryerson in 1917 and was active in the sales department at Chicago from 1921 to 1936.



Alexander E. Walker

Frederick A. Ernst

Ervin J. Sanne

Frederick A. Ernst, assistant district sales manager at St. Louis since 1936, has been named d
sales manager at St. Paul, su
ing Mr. Sanne. His appoin
also is effective May 1. Mr.
entered the steel industry in
with Trumbull Steel Co. an
successively affiliated with th
con Steel Co., Granite City Ste
and Columbia Steel Co. prior
association with Inland in 19

Harry A. Johnson, who join
land at Chicago in 1933 and w
the sales staff of the Milwauke
trict sales office from 1935 th
1938, has been named assistan
trict sales manager at St.
effective at once.

♦

Joe Fal, service man for W
& Swasey Co., Cleveland, with
quarters in Houston, Tex., is
to France temporarily to
vise a large installation. D
his absence he will be succeed
Elmer Wrobbel, who has bee
ing service work for the compa
the northeastern part of the
try.

♦

George J. Helfrich has bee
pointed Chicago district sales
ager, Reading-Pratt & Cady
sion of American Chain &
Co. Inc., with headquarters a
West Madison street. He has
associated with the company
1925.

♦

W. W. Peattie, president, N
ern Engineering Works, Detroit
been elected chairman, Electric
Manufacturers association,
York. He succeeds J. F. C
American Engineering Co. Wil
White, secretary and general
ager, Euclid Crane & Hoist Co.,
clid, O., has been elected vice c
man of the association.

♦

B. D. Landes has been appoi
general sales manager, H. K.
er Co., maker of industrial loc
tives, Pittsburgh. A graduate
Purdue university, Mr. Landes
manager of engineering service
the A. M. Byers Co., Pittsburgh,
before that was associated
Harnischfeger Corp., Milwaukee

♦

Carl L. Halpin has resigned
purchasing agent, Square D
Detroit, to become associated w
Fisher Body Corp., Grand Rap
Mich. E. W. Tiderington, who
several years was assistant
chasing agent at Square D
later was in the purchasing dep
ment of Ainsworth Mfg. Co.,
been named to succeed Mr. Hal

♦

Whipple Jacobs, vice president
charge of sales, Belden Mfg.
Chicago, has been elected preside
to succeed the late Joseph C.

Hopewell L. Rogers, hereto- ice chairman, has become an of the board, also succeed- r. Belden. Charles S. Craig- a vice president, and Herbert attorney, have been elected rectors, to replace Mr. Belden hn W. O'Leary, who resigned.

♦

ald J. Riddell, formerly weld- pecialist, Philadelphia works, al Electric Co., has been eastern district representa- for Progressive Welder Co., t. Mr. Riddell's territory will e all states east of Ohio, with uarters at 2308 Chestnut av- Ardmore, Pa.

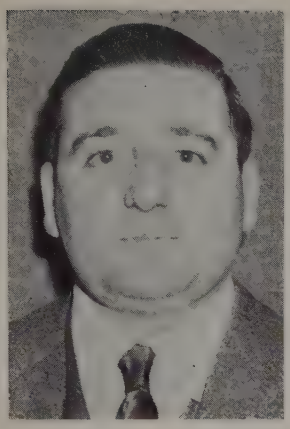
♦

N. Ott, since 1919 president, er Lens Co., Buffalo, has been d chairman of the board. He een succeeded as president by Witherspoon, who has been in the management of Spen-

H. N. Ott

Lens since 1935, serving as a ber of the executive committee, ice president and general man- Mr. Witherspoon, also a di- r of Pittsburgh Testing Labora- s and president of Optical Glass

B. H. Witherspoon



Donald J. Riddell

Products Inc., Hamburg, N. Y., retains the position of general manager.

Other officers elected are: H. D. Rhynedance, vice president and general sales manager; B. Glenny, treasurer, and C. W. Barton, secretary and manager of research and development.

♦

Mrs. Jean Shassere Mills, one of the few steel saleswomen in the industry, is retiring from business following her marriage March 25 to Robert L. Mills, a merchant of Robinson, Ill. Mrs. Mills entered the steel business in Terre Haute, Ind., in 1920 as representative of a Chicago company, later going to Chicago. She obtained orders for the structural steel used in many large Chicago buildings.

♦

Directors of National Steel Corp., Pittsburgh, were re-elected at the annual meeting of stockholders March 27. They are E. T. Weir, chairman; Frank W. Blair, Maurice Falk, George R. Fink, Howard M. Hanna, George M. Humphrey, Thomas E. Millsop, Edmund W. Mudge, Carl N. Osborne, Murray W. Sales, and Charles M. Thorp.

DIED:

■ CHARLES BERNARD MURRAY, 73, president, Crowell & Murray, chemists, mining engineers and metallurgists, Cleveland, March 25, by automobile accident. Born in Worcester, Mass., April 6, 1866, he graduated as bachelor of science from Worcester Polytechnic institute in 1887 and in 1937, on the fiftieth anniversary of his graduation, was awarded an honorary degree of doctor of engineering by the institute.

On graduation he became assistant chemist with Joliet Steel Co., Joliet, Ill., now part of Carnegie-Illinois Steel Corp. He was made chief chemist and metallurgist at Edgar Thomson works of Carnegie Steel Co., Pittsburgh, in 1893. In 1904 he established a commercial laboratory in Pittsburgh and in 1907 moved to Cleveland and with Benedict Crowell formed the firm of Crowell & Murray. The book, *Iron Ores of Lake Superior,* was issued by the firm under Mr. Murray's supervision.

He was a member, American Institute of Mining and Metallurgical Engineers, American Chemical society, Society of Chemical Industry, American Iron and Steel institute, American Society for Metals, Lake Superior Iron Ore association, Cleveland Engineering society and was a member of the executive board, American Society for Testing Materials.

♦

Virgil J. Tibbitts, 33, superintendent, Ohio Nut & Bolt Co., Berea, O., March 26 in that city.

♦

John E. Nelson, 60, general manager, Duluth branch, Republic Steel Corp., in that city, March 29. He had been in the employ of the company 40 years.

♦

Otto Kafka, 59, head of the steel exporting firm of Otto Kafka Inc., New York, March 24 at his home in Bayside, Queens. In 1916 he organized the American Steel Export Co. and Vulcan Steel Products Co., in association with T. Coleman duPont, continuing with those firms until 1919 when he went into business for himself.

♦

Elwood Burdsall, 82, secretary-treasurer, Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y., March 10. Following graduation from Cornell university in 1878 with a degree in mechanical engineering, he joined the Bolt & Nut company which his father and William E. Ward had founded in 1845. He became secretary in 1901 and secretary-treasurer in 1915. Mr. Burdsall was a member, American Society of Mechanical Engineers, and had various other business and organization affiliations.

♦

Rowland S. LeBarre, 61, sales representative for Republic Steel Corp., in Detroit, March 26. Prior to opening a Detroit office in 1924 for Interstate Iron & Steel Co., Chicago, which later became part of Republic, Mr. LeBarre represented the Illinois Steel, Carnegie Steel and American Sheet & Tin Plate companies in New Orleans from 1902 to 1905 when he was transferred to Cleveland to handle sales for Illinois and Carnegie. In 1919 he was made general manager of alloy sales for Interstate.

QUALITY AND SERVICE

A close control of quality is possible because the l
raw material is made in our Phillipsdale, R. I., mill w
steel craftsmen follow rigid specifications. Each lot c
to New York with an identification tag telling the e
content. As your order goes through both plants, sam
are taken at various stages for checking specifica
and a percentage of each operation is examined m
scopically. This strict attention to Uniform Quality
Good Service have made a valued list of customers
always rely on Washburn.

WASHBURN FLAT STR

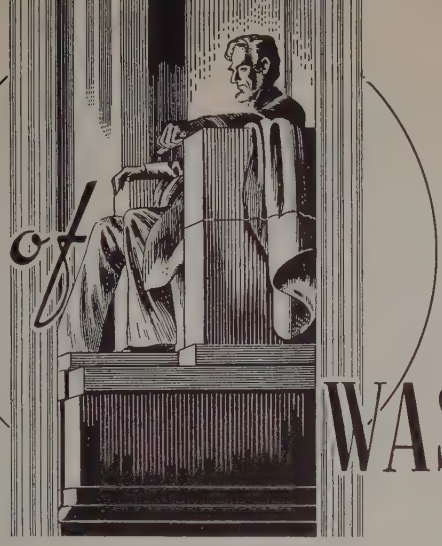
**is available in untempered and tempered forms and can be
nished with Bright, Galvanized, Tinned and Cadmium Finis
Widths from 1/16" to 6" and thicknesses from .004 to .**

WASHBURN WIRE CO., NEW YORK CITY

WASHBURN

CLEAN, UNIFORM BILLETS - STRIP - RECTANGULAR, ROUND, FLAT RO
TEMPERED AND UNTEMPERED FLAT AND ROUND HIGH CARBON WIR

Windows of WASHINGTON



By L. M. LAMM
Washington Editor, STEEL

WASHINGTON

HEARINGS will be started before senate labor committee April 11 proposed amendments to the agner labor relations act. Hearings ve been postponed due to oppo-ion by the CIO and because Presi-nt Roosevelt believed they should t go ahead while the CIO and L were conducting "peace" ne-iations.

Senator Wagner, New York, thor of the bill, will be the first tness followed by four proponents amendments: Senators Walsh, assachusetts, Burke, Nebraska, lman, Oregon, and Logan, Ken-cky. Witnesses representing the tional labor relations board, labor partment, AFL, CIO, and business erests also will be heard. The tailed calendar has not yet been ranged.

Fundamental changes are pro-sed by some pending amendments, nator Walsh's amendments are pported by the AFL. Among her things they seek to curtail e discretionary powers of the la-r board and broaden the right of peal to the courts from the board's cisions. It is anticipated the hear-gs will continue for two or three eeks and those in charge have in-cated action taken by the commit-e will be swift enough to permit ngressional action at the present ssion.

Revision of the act was urged st week by the National Associa-n of Manufacturers which claims bor strife will persist until all rsons "stand equally before the w." The association in a state-ent asked the law be amended eight major counts and the asso-ation's statement was accom-nied by a symposium of public inion throughout the country.

The symposium embraced expres-ons critical of the act or its ad-inistration by legislators, labor leaders, business men, newspapers, columnists, judges, lawyers, farmers, doctors, educators and the general public.

The position of the National Association of Manufacturers, as outlined by the statement, is "that there can be no permanent solution of labor problems so long as the law places restraints upon one party to the employer-employe relationship, and leaves the other party free of all restraint."

It added: "Neither can there be a permanent solution until the right of free association on the part of employers and freedom of action on their part so long as they do not commit unfair practices, is recognized to the same extent as it is in the case of employes; nor can there be any public confidence in the agencies established to administer the national labor policy unless all persons stand equally before the law and the administrative agencies with full and equal rights to fair hearings and impartial decisions."

MINIMUM STEEL WAGES AGAIN ENJOINED

The court of appeals of the District of Columbia last week granted a temporary injunction against Secretary of Labor Perkins' putting into force minimum wages in the steel industry until after the court has reached a decision on an appeal. Argument on the appeal will be heard April 3.

Appeal and application for a temporary injunction were filed by seven small eastern steel manufacturers who originally took the case into court. The entire steel industry was affected by the court's granting of the temporary injunction and the labor department's minimum wages will not become effective until the court renders its decision in the appeal.

This case originated in the district court for the District of Columbia when the seven companies asked for a restraining order. Justice Jennings Bailey of the district court granted a temporary injunction, but on argument refused to make it permanent. Counsel for the steel companies then appealed to the United States court of appeals. This is the first time enforcement of the Walsh-Healey law has been taken into the courts.

EARLY ADJOURNMENT OF CONGRESS PREDICTED

Seasonal predictions are being made for an early adjournment of congress. Following a conference with congressional leaders last week before the President left for his vacation, there was a definite intimation he had asked all but essential legislation be sidetracked so that congress could adjourn for economic purposes.

While no official statement was made, it was reliably reported the President asked legislative leaders to block revision of the national labor relations act, that there be no further slum-clearance legislation, and that the revision of the corporate tax laws be averted.

The President is reported also to have asked for the continuance of the nuisance taxes which amount to about $750,000,000 a year and that congress abandon the 50 per cent increase in social security taxes.

WAR DEPARTMENT OPPOSES WAR PROFITS TAX BILL

War department will oppose any drastic tax measure to take the profit out of war, it was reported last week. A bill along these lines has been introduced in the senate and endorsed by 50 members.

Such a proposal, according to war department officials, conflicts with the army's own industrial mobilization plans, to be put into effect immediately in the event of war. While the war department officials refuse to be quoted on the subject before

a formal expression from the secretary, it was argued the proposed taxes will practically be confiscatory.

PROPOSE INVESTIGATION OF MACHINES AND JOBS

A joint resolution to investigate the displacement of labor by machinery has been introduced in the house by Representative Faddis, Pennsylvania.

Resolution provides for the appointment of a committee on technological unemployment by the President and to consist of a representative of the AFL, CIO, department of labor, department of commerce and two representatives of the United States chamber of commerce.

The committee is to investigate the effects of recent technological changes in the manufacturing, mining, transportation, and distribution industries, upon the employment of labor and the possibility of further technological changes in these industries. In preparation for such an investigation and public hearings by the committee, the resolution provides the labor department shall prepare and analyze such data bearing on the displacement of labor by machinery and other technological changes.

An appropriation of $200,000 is provided, of which $150,000 shall be available to the labor department for its work, with the remaining $50,000 to go to the committee. The resolution provides that the committee shall report its findings to congress on or before June 1 of next year.

ICC REPORTS TO CONGRESS ON PENDING RAILWAY BILLS

Interstate commerce commission last week sent a communication to congress on various pending railroad bills.

A portion of the report dealt with railroad equipment. The committee of three commission members proposed $300,000,000 be made available for loans to finance shop and rolling equipment purchases.

Committee further recommended that for a period of 12 months or so the present requirement of law be suspended to the effect that before the RFC may make loans to railroads for certain purposes the commission must certify: "That such railroad, on the basis of present and prospective earnings, may reasonably be expected to meet its fixed charges without reduction thereof through judicial reorganization." It suggested the commission be required only to certify: "That the prospective earning power of the applicant together with the character and value of the security offered, furnish, in the opinion of the commission, reasonable assurance of the applicant's ability to repay the loan within the time fixed therefor, and reasonable protection to the United States."

The committee of six, representing railroad management and railway labor, recommended: "The RFC be empowered to make loans for railroad maintenance of way, structures, and equipment, provided the borrower agrees to use the proceeds for the direct employment of labor or the purchase of materials." This committee also recommended the RFC "be authorized to make loans for the construction or acquisition of railroad equipment up to the full cost thereof on the security of trust certificates on the equipment so acquired."

RECOMMENDS PENALTIES FOR WALSH-HEALEY VIOLATIONS

House last week passed the labor department appropriation bill carrying a provision for the hours and wages division for the coming fiscal year of $3,350,000. Bill also includes $322,120 for the public contracts board, an increase of $22,120 over the current appropriation.

In connection with the public contracts board which administers the Walsh-Healey act, the house committee in approving the appropriation called attention to the fact that the Walsh-Healey law makes no provision for a penalty to be imposed on those violating its provisions, except denying the right of the violator to bid on subsequent government contracts.

"The only accountability," said the committee, "that can be demanded of a contractor subject to the operations of the act is to comply with the terms of the agreement. Obviously merely to require a person to do what he already has contracted to do is in nowise a deterrent and it is much to be hoped that the committee on labor of the house will give appropriate consideration to this problem during the pending session of congress."

GOVERNMENT IRON, STEEL AWARDS TOTAL $356,355

During the week ended March 25, the government purchased $356,354.61 worth of iron, steel and their products under the Walsh-Healey act: Heppenstall Co., Pittsburgh, $11,873.90; Nathan Straus-Duparquet Inc., New York, $9,578.40 (estimated); Atlantic Metal Products Inc., Long Island City, N. Y., $11,726; Sneed & Co., New York, $17,960; Carnegie-Illinois Steel Corp., Washington, $66,480 (estimated); Ross Galvanizing Works Inc., Brooklyn, N. Y., $12,885.69 (estimated); Jones & Laughlin Steel Corp., Pittsburgh, $10,545 (estimated); United States Steel Products Co., Washington, $41,310.42; Inland Steel Co., Chicago, $83,782.25; Bethlehem Co., San Francisco, $12,135.50; less Iron & Steel Corp., Baltin $17,005.45; National Malleabl Steel Castings Co., Cleveland, 072.

"FOREIGN TRADE WEEK" IS SET FOR MAY 21-27

Chamber of commerce of United States has designated 21-27 for the observance of tional Foreign Trade Week" ar organizing appropriate meet throughout that period. Initi in 1935 when 600 groups pa pated, the movement has gr steadily and in 1938 over groups took part.

Object of the movement is: To direct attention to the for trade of the United States, its tional importance, and its rela ship to domestic industry and tr and (2) to stimulate local su and development of foreign t possibilities in individual cities towns and in individual indust and trade.

E. L. Bacher, manager of chamber's foreign commerce de ment, Washington, is direc plans for the event.

SHARP DEMAND IN CHILE FOR IRON, STEEL PRODUCTS

Demand in Chile for iron steel products, principally b sheets to be galvanized for roof and skelp for manufacture of has increased sharply since earthquake in January, accordin a report to the department of c merce.

The United States would norm supply the bulk of such dem since American products are ored because of quality and q delivery. Owing to the recent a shortage of dollar exchange, h ever, the Exchange Control com sion finds it necessary to cur imports of even essential comm ties from the United States, t diverting purchases to count which have exchange available, report stated.

It is understood that 1400 t of corrugated galvanized sh have been purchased from Arg tina with money donated by t country to the earthquake re funds. Two local galvanizing pla one in Santiago and one in V paraiso, are reported to have ranged to obtain 4000 tons of bl sheets from Belgium in return a barter of barley.

■ United States Steel Corp. comm stockholders of record March 4 n bered 167,750, a decrease of 1 since Nov. 30. Preferred stockh ers of record Feb. 3, totaled 66,7 an increase of 411 since Oct. 28.

VIATION

R CORPS TO PLACE ORDERS TALING $50,000,000

NITIAL orders in the air corps' horized expansion program will released in amount of $50,000,000 lowing President Roosevelt's ap- val of the war department ap- priation bill, it is disclosed by curement officers. Probable to- l of awards during 1939 is esti- ted at 1000 military planes.

Bids are called at Wright field, yton, O., as follows: July 5, two d four-engined bombers; July 6, vanced training planes; July 7, sic and primary trainers; July interceptor pursuit, multi-place hters and observation ships.

French air ministry last week con- cted for an additional 100 fight- craft, increasing its current nerican bookings to 715 planes. is indicated Glenn L. Martin Co. eived the award, reportedly for ht bombers.

France also ordered 200 engines lued at $2,800,000 from Pratt & hitney division of United Aircraft rp., East Hartford, Conn. This reases its engine awards here to 00, at total cost of about $14,000,- 0. Option is held for an additional 0 motors. United Airlines has aced an order with Pratt & Whit- y for 30 Wasp 1000-horsepower gines.

Aeronautical equipment just or- red: For the army, Fairchild rial Camera Corp., Jamaica, L. I., mputer assemblies, $55,104; and r navy, Hamilton Standard pro- ller division of United Aircraft Corp., East Hartford, Conn., propellers, $16,311; and Worthington Pump & Machinery Co., Harrison, N. J., pumps, $145,878.

The navy last week awarded a $1,516,357 contract for airplanes and parts to El Segundo division, Douglas Aircraft Co., El Segundo, Calif.

Newport News Shipbuilding & Drydock Co., Newport News, Va., has booked a $31,800,000 navy award for constructing aircraft carrier HORNET. Taking 13,000 tons of steel, the ship will require 34 months to build, and is to have a complement of 108 planes.

United Aircraft Corp. will soon let contracts for building a $300,000 addition to the Stratford, Conn., plant of its Chance Vought and Sikorsky airplane divisions. Architect is Albert Kahn Inc., Detroit.

Solar Aircraft Co., San Diego, Calif., is preparing to erect a $35,000,170 x 180-foot factory unit, and will purchase machinery costing another $30,000.

Recent declarations regarding necessity for greater aeronautical research are resulting in considerable expansion of testing and development facilities. Navy department will build a $1,800,000 engineering laboratory at its Philadelphia aircraft factory, installing motors, regulators, conveyors and other equipment.

Reporting on its recent airport survey, civil aeronautics authority has recommended congress appropriate $128,000,000 during the next year to improve the nation's airfields with additional hangars, lighting facilities and runways.

Welding Aluminum Alloy Sheets for Wing Covering

Surfaces for Clipper plane wings are formed in Boeing Aircraft Co.'s Seattle plant by seaming together small alclad aluminum alloy sheets with an electric spot-welder into long sheets, which are coiled as shown above. Clipper wings measure 152 feet from tip to tip

Activities of Steel Users, Makers

■ AN ORDER permitting disposal of certain assets of Burden Iron Co., Troy, N. Y., under direction of Walter W. Weismann, president, Aetna Industrial Corp., New York, has been issued in federal court. An inventory will be cataloged and it is expected the assets will be sold privately within 30 to 60 days. Negotiations looking toward the continuation of the horseshoe business, conducted under direction of Joseph W. Burden, have been practically completed.

♦

Negotiations whereby American Brake Shoe & Foundry Co., New York, will acquire Kellogg Compressor & Mfg. Co., Rochester, N. Y., are under way and final details are expected to be closed within the next few days, according to David W. Schelter, treasurer and controller of Kellogg. This company makes air compressors used at gasoline stations.

♦

District representatives, sales executives, and engineers of the stoker division, Link-Belt Co., recently held their annual sales and engineering conference in Chicago. In the opinion of the group, 1939 will again show an increase in stoker sales.

♦

Jones & Laughlin Steel Corp. has moved its Chicago district sales office to the tower of the Bankers building, Clark and Adams streets. Samuel A. Fuller is district sales manager.

♦

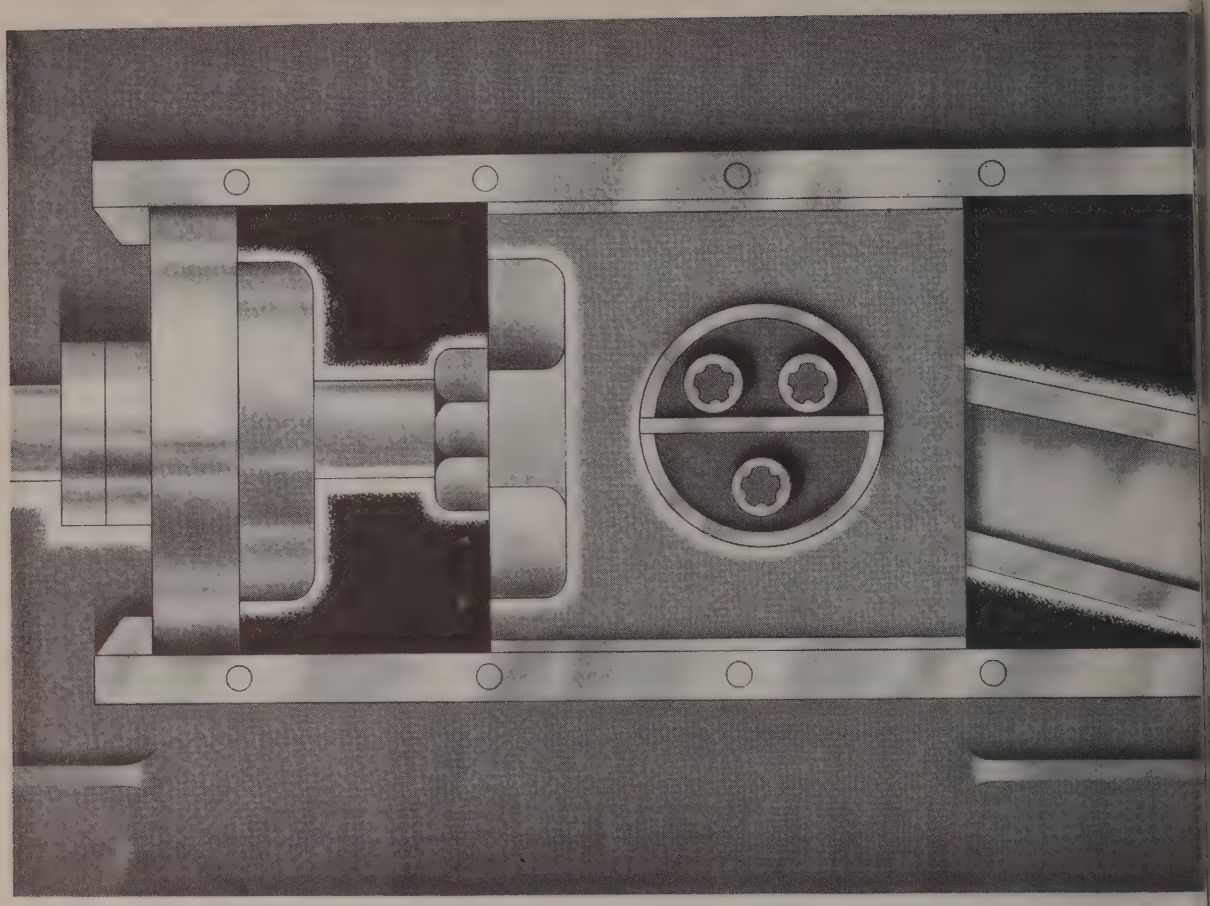
Meehanite Metal Corp., Pittsburgh, has granted the right to manufacture Meehanite metal to Lowes Foundry Co., Lower Hutt, New Zealand, and Booth-MacDonald & Co. Ltd., Christ-Church, Australia.

♦

Taft-Peirce Mfg. Co., Woonsocket, R. I., and its Detroit representative, John E. Livingstone Co., have moved back to their former Detroit address at 2921 East Grant boulevard. J. B. Rousseau, Taft-Peirce Detroit district sales manager, will make his headquarters at the same address.

♦

Sauereisen-Fuchs & Co., Fulton building, Pittsburgh, has been organized to manufacture and market industrial ceramic and cement products. Among these is the Sauereisen patented brick for use in pickling tanks or wherever acid-proof lining or flooring is required. C. Fred Sauereisen, of Sauereisen Cements Co., is president of the new company. G. A. Fuchs, formerly of Harbison-Walker Refractories, is vice president and general manager.



MAKING PRODUCTION DOLLARS S-T-R-E-T-C-H

The simplification or elimination of fabricating processes is one way of making production dollars go farther. Molybdenum steels are often a help in that way.

For instance, a manufacturer of high pressure motor driven pumps uses cast Nickel-Molybdenum steel for cross-head guides because it has the required toughness and hardness. In addition, the ready machinability and close grained structure of the steel make it possible to produce a good bearing surface in the guide runways by a light cut with a shearing to One finishing operation — grinding — is entire eliminated.

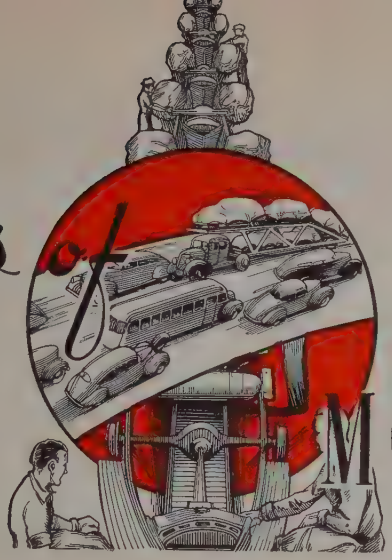
Rechecking your own material specifications m reveal places where Molybdenum steels will produ better results, or lower costs, or both. Our technic book, "Molybdenum in Steel," will be sent free any interested production executive or engineer w requests it.

PRODUCERS OF FERRO-MOLYBDENUM, CALCIUM MOLYBDATE AND MOLYBDENUM TRIOXI

Climax Mo-lyb-den-um Compan
500 Fifth Avenue · New York Cit

MOLY

Mirrors of MOTORDOM



By A. H. ALLEN
Detroit Editor, STEEL

Material appearing in this department is fully protected by copyright, and its use in any form whatsoever without permission is prohibited.

DETROIT

ONE characteristic of next year's odels which now are in the prep-atory stage will be a definite trend ward wider and longer hood tops tterned after a design which per-ps can best be explained by the ree words, "down in front." By xt year the change to the alliga-r-type hood, hinged at the front or ck, will be practically universal d the day of the double hood, nged along the center line, will be er. The new designs are less ex-nsive, give access to both sides of e engine with a single lifting, and e more adaptable to the stream-ned front-end designs.

Hood top widths are being stepped p, incidentally. Buick, for example, quires a steel sheet 88 inches wide d 84 inches long, or more than 7 et square. While steel mills have o trouble in supplying any de-red length in this type of sheet, ere are only a few mills equipped turn out a width of 88 inches.

To Require Deeper Drawing

The new hood tops, instead of rminating at the belt line, will weep down the nose half way or ore to the axle line, which means at in some of these new designs n appreciable amount of draw has be given the sheet, whereas in ast years these tops went little be-ond a blanking operation or at the ost only a slight dishing.

Continuing the hood top down the ront of the car will mean disap-earance of center radiator grilles nd cooling air will have to be han-led by catwalk grilles plus what-ver louvering is necessary in the ront assembly. The 1940 Nash, for xample, will show a completely re-orked front end with larger cat-alk grilles comprising vertical right metal bars capped by a cat-alk which appears to roll out of e top of the grille. Center grille has been dispensed with altogether; headlamps continue in front fenders.

Those who have seen the new design say it is even more attractive than the present Nash lines which are rated near the top in the industry by impartial critics. Body lines for 1940 are changed only slightly from this year which is to be expected in view of the fact Nash spent over $2,500,000 on tooling up for 1939 models.

Work is proceeding on the small Nash line which probably will be introduced this fall along with the larger models, thereby giving Nash dealers a more complete coverage of the low and intermediate price fields.

In company with hood tops, front fenders of 1940 models also will be required to take deeper draws to conform to designers' conceptions. On this year's models it was believed the limits of deep drawing had just about been reached on front

Diesel Truck Carries 35-Ton Load

■ International Nickel Co. uses six huge Mack trucks at its open pit Frood mine, Copper Cliffs, Ont. Powered with a Cummins diesel developing 150 horsepower at 1800 revolutions per minute, each of these new triple-axle trucks has a capacity of 35 tons or 21 cubic yards, weighs 57 tons loaded, has ten forward speeds, two reverse, uses more than a ton of alloy steel with nickel content ranging from 3 to 4½ per cent. Two hydraulic cylinders, each with a 4-unit telescoping section, dump the body. Bucyrus-Erie shovel with 4½-cubic yard dipper weighs 165 tons, employs more than 16 tons of nickel alloy steels

fenders, but present indications are that they will be carried a step further next year. The deeper the draw becomes on fenders, the more difficult is the tooling problem and the greater the possibility of encountering an objectionable number of defective pieces in process. To circumvent these problems, manufacturing experts are turning to the idea of making fenders in two separate pieces and then welding them together.

There are two ways in which this can be done. Either the piece can be split longitudinally or across the nose. Since it is the nose of the fender which usually must take the deepest draw, and since fender noses have been further complicated by incorporating headlamps in them it is occasionally preferred to stamp the nose separately and then weld it to the rest of the fender. In this way the difficulty of withdrawing a press punch after the severe draw in a one-piece fender is overcome, die designs are simplified and rejects are held within their normal limits of 2 to 5 per cent.

Eventually it is hoped to be able to make the front end of a car in three pieces—two fender stampings and the catwalk and radiator shell stamping. However, with present designs this is virtually impossible, so various compromises must be made.

■ TORTUOUS path leading toward introduction of the Hupmobile Skylark models has been far from traversed as yet, but another step was taken last week with awarding of contract for 1000 frames reportedly to Truscon Steel Co. Fenders will be supplied by Hayes Body Co. Inquiries for a wide range of other parts have been issued on the basis of deliveries starting early this month, but for a large number of dies and tools, work must be started from scratch. Conceding the utmost speed in completion of such dies, it is hard to see how many cars can be completed much before July 1.

Meanwhile the company is cleaning up some inventories of stocks in its senior line and has placed attractive prices on much of this merchandise. Assemblies in the senior models are running around 100 per week.

Arrangements have been made for a loan of $250,000 to Graham, under supervision of the RFC, to permit manufacture of an additional lot of 1000 cars. Production, on a five-day week basis, runs around 140 cars. In the first three months of this year, Graham assembled about 1500 jobs. Seasonal improvement in tractor buying should aid Graham in moving stocks of tractors built during the winter season, and this plus the hope for improved retail sales of cars in the next three months, should assist this producer in returning to a profitable basis of operations.

■ EXPERIMENTAL work being conducted by an Ohio steel company may lead to the commercial introduction of a new type of aluminum-coated flat-rolled steel material which can compete with such products as terne plate on a price basis.

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

	1937	1938	1939
Jan.	399,186	227,130	353,946
Feb.	383,900	202,589	321,141
March	519,022	238,598	.....
April	553,231	238,133	.....
May	540,377	210,183	.....
June	521,153	189,399	.....
July	456,909	150,444	.....
Aug.	405,072	96,936	.....
Sept.	175,630	89,623	.....
Oct.	337,979	215,296	.....
Nov.	376,629	390,350	.....
Dec.	347,349	407,016	.....
Year	5,016,437	2,655,777	.....

Estimated by *Ward's Reports*

Week ended:	1939	1938†
March 4	78,705	54,440
March 11	84,095	57,438
March 18	86,725	57,555
March 25	89,400	56,800
April 1	85,980	57,500

†Comparable week.

	Week Ended	
	April 1	Mar. 25
General Motors	33,260	35,230
Chrysler	20,375	20,825
Ford	22,230	22,350
All others	10,115	10,995

A fair tonnage of terne plate goes into gasoline tanks for the motor industry, and there is a constant search being made for a less expensive and perhaps improved type of flat-rolled steel with corrosion-proof coating which can be subjected to forming operations without harm to the coating.

Another steel company has been experimenting for some time with sheets and strip having an electroplated zinc coating instead of the customary hot-dip galvanized coating. While good reports are heard of these tests, no commercial introduction of such a material has been made.

The recent suggestion that steel can be given an integral coating of stainless-type alloy at a price commensurate with galvanized and terne plate has stimulated interest in the subject of coatings, and some important developments are foreshadowed in this field. Crown Cork & Seal Co., Baltimore, for sev... years has been making an alu... num-coated strip steel, but not m... is known of this product. The ... aluminum development, said to ... under the aegis of the Aluminum ... of America in co-operation wit... steel producer, should bear wa... ing.

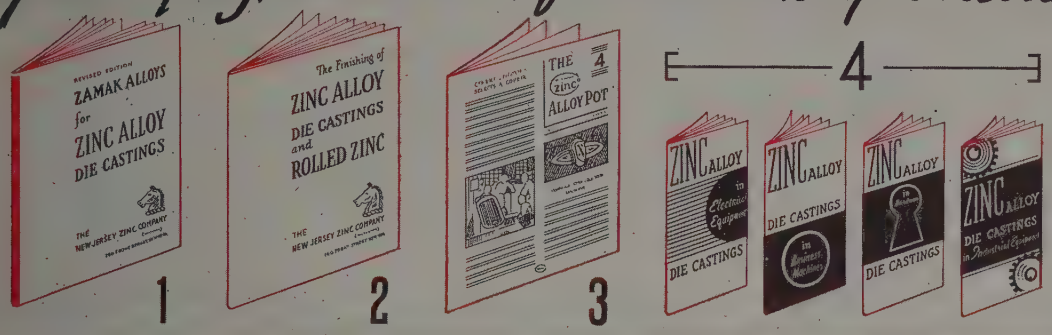
■ PRESENCE of a number of ... formerly associated with Chry... Corp. in the personnel of the Wil... Overland organization at Toledo, ... naturally led to reports concern... the possibility Chrysler was mov... toward control of Willys operati... This was vehemently denied by ... Chrysler management, and in ... cold light of analysis it is diffi... to determine any sound reason ... Chrysler should be interested in ... quiring Willys properties. Any ... mediate expansion of Chrysler p... ably would be concentrated n... present Detroit plants or in I... ana.

Later investigation has sugges... another probability concerning ... personnel shifts. It is related ... good authority that some of th... Toledoans were anticipating a r... er thorough reshuffling of Chry... personnel, and, reading the ha... writing on the wall, set out to ... quire a new outlet for their tale... As yet, other than these transf... to Toledo, there have been no m... jor upheavals in Chrysler execut... personnel, but in trade circles h... word is being passed around of ... imminent shakeup.

■ HUDSON has announced quie... a new series of 1939 models to ... known as the Pacemaker six li... They are on 118-inch wheelba... powered with 96-horsepower moto... and fitted into a price class betwe... the Hudson 112 and the deluxe s... The new series is available in fo... body types ranging in price fr... $793 to $854, delivered Detroit, abo... $50 under the level of the delu... six.

Chrysler has extended its contr... with UAW until April 22, to perm... the union to settle differences wit... its ranks. Meanwhile the cor... ration is taking the position that ... cannot bargain with any one facti... of the union without representativ... of other factions being present. Th... pretty well stymies any dealin... with the UAW in its present d... membered state. The attitude is fa... ly general throughout the autom... tive industry, and throws the weig... of responsibility on the shoulders ... leaders of opposing factions in t... union who themselves are in a qua... dry until court action can determi... the rights of various officers a... acting officers, as well as unlockin... an impounded treasury.

Try this "quiz," then send for the books you need


REVISED EDITION
ZAMAK ALLOYS for ZINC ALLOY DIE CASTINGS
THE NEW JERSEY ZINC COMPANY
1
The Finishing of ZINC ALLOY DIE CASTINGS and ROLLED ZINC
THE NEW JERSEY ZINC COMPANY
2
THE ZINC ALLOY POT
3
4
ZINC ALLOY in Electrical Equipment DIE CASTINGS
ZINC ALLOY DIE CASTINGS in Business Machines
ZINC ALLOY DIE CASTINGS
ZINC ALLOY DIE CASTINGS in Industrial Equipment

1 **Q How will ZINC Alloy Die Castings stand up under shock loads?**

A Every time this stamping ring is used it is struck with a hammer—dating the sale of storage batteries. Yet, as a ZINC Alloy Die Casting, it can withstand this shock punishment over a long period of time. Impact strength is just one of the physical properties covered in the Research Bulletin "*Zamak Alloys for ZINC Alloy Die Castings.*"

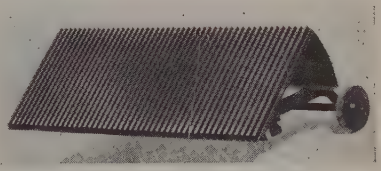
2 **Q What can be expected in the way of service from plated coatings on die cast parts?**

A When a plated coating of sufficient thickness is properly applied to a ZINC Alloy Die Casting it will adhere and remain lustrous for the normal service life of most parts used indoors. The mixing machine shown above—conceived by Fred Waring, the well-known orchestra leader—takes considerable abuse in service. The die cast base is chromium plated, and not one complaint on finish has been received since the machine was first placed on the market. See "*The Finishing of ZINC Alloy Die Castings and Rolled Zinc.*"

3 **Q What is the size range of ZINC Alloy Die Castings?**

A An automobile windshield frame weighing 33 pounds and measuring 50" x 22" was successfully die cast in ZINC Alloy. At the other end of the range we find a tiny slide fastener element. This die casting weighs .022 gram—20,640 castings to the pound. "*The Alloy Pot*"—a periodical—keeps its readers informed on all die casting developments such as these.

4 **Q Has the scope of die casting applications been widened in the last few years?**



A Those engineers who think of ZINC Alloy Die Castings in terms of simple, decorative parts only, will do well to investigate the "tough application" trend in this industry. For example, who would have considered die casting an escalator tread a few short years ago? The one shown here is doing an excellent job of resisting abrasion. Die casting applications in four different industries are pictured in the four booklets "*Zinc Alloy Die Castings in Business Machines—In Electrical Equipment—In Hardware—In Industrial Equipment.*"

Any or all of the booklets indicated above will be sent on receipt of a request on a Company letterhead . . . Also, we will be pleased to place your name on "The Alloy Pot" mailing list . . . If you have any specific questions on the subject of ZINC Alloy Die Castings we suggest that you consult a commercial die caster—or, our Technical Service staff is at your disposal. The New Jersey Zinc Company, 160 Front Street, New York City, New York.

ZINC ALLOY DIE CASTINGS

The Research was done, the Alloys were developed, and most Die Castings are specified with

HORSE HEAD SPECIAL (99.99+% Uniform Quality) ZINC

February Imports Off 27 Per Cent

■ FEBRUARY imports of steel and iron products, excluding scrap, totaled 17,736 gross tons valued at $1,236,673. These figures represent a decline of 6595 tons, or 27 per cent, in volume, and $492,472, or 28 per cent, in value, from January. Comparable figures for February, 1938, are 19,589 tons, valued at $1,414,688.

As reported by the metals and minerals division, department of commerce, ferromanganese was the largest item, 2889 tons, imported in February. This included 1301 tons from Norway and 1264 tons from Czechoslovakia. Belgium was the chief source of imports, its total of 5296 tons including 1850 tons of structural shapes, 1197 tons of hoops and bands and 802 tons of bars. German shipments totaled 3632 tons, including 1043 tons of pipe and 1034 tons of barbed wire. Canada's total was 2267 tons.

Scrap imports, 1413 tons, were less than half as large as in January —3333 tons—but had a much greater value per unit, as indicated by total of $22,568, compared with $30,707 in January. Less than one ton of scrap, valued at $4, was imported in February, 1938. Canada shipped 1393 tons in February; and Sweden, 20.

FOREIGN TRADE OF UNITED STATES IN IRON AND STEEL

Gross Tons

	1939 Exports	1939 Imports	1938 Exports	1938 Imports
Jan.	362,672	27,664	586,294	29,631
Feb.	359,690	19,149	460,640	19,589
March	.....	.....	526,883	11,827
April	.....	.....	489,202	21,237
May	.....	.....	540,639	20,814
June	.....	.....	312,021	15,887
July	.....	.....	263,699	14,728
Aug.	.....	.....	242,139	20,041
Sept.	.....	.....	346,068	27,958
Oct.	.....	.....	425,431	26,445
Nov.	.....	.....	469,596	27,627
Dec.	.....	.....	490,095	28,767
Total	.....	.....	5,152,707	264,551

ORIGIN OF FEBRUARY IMPORTS

Gross Tons

	Iron ore	Pig iron	Manganese ore	Ferromanganese
Norway	7,038	.....	.....	1,301
Sweden	7,157	.....	.....	.....
France	.....	.....	5	63
Canada	60	105	.....	.....
Cuba	21,000	.....	5,572	.....
Chile	130,500	.....	.....	.....
Australia	13,016	.....	.....	.....
Netherlands	.....	99	.....	.....
British India	.....	399	1,591	.....
Soviet Russia	.....	.....	6,208	.....
South Africa	.....	.....	9	.....
Gold Coast	.....	.....	9,353	.....
Czechoslovakia	.....	.....	.....	1,264
Poland	.....	.....	.....	21
Yugoslavia	.....	.....	.....	240
Brazil	.....	.....	3,351	.....
Total	178,771	603	26,089	2,889

	Sheets, skelp and sawplate	Structural steel	Steel bars	Hoops and bands
Belgium	20	1,850	802	1,197
France	57	463	238	212
United Kingdom	4	.....	32	.....
Germany	.....	99	154	238
Sweden	15	.....	155	23
Czechoslovakia	.....	.....	4	.....
Total	96	2,412	1,385	1,670

U. S. IMPORTS FOR CONSUMPTION OF IRON AND STEEL PRODUCTS

Gross Tons

Articles	Feb. 1939	Jan. 1939	Jan. thru Feb. '39
Pig iron	603	586	1,189
Sponge iron	266	34	300
Ferromanganese (1)	2,889	3,150	6,039
Spiegeleisen	2,033	976	3,009
Ferrochrome (2)	.....	.....	.....
Ferrosilicon (3)	273	74	347
Other ferroalloys (4)	7	25	32
Steel ingots, blooms	.....	1	1
Billets	7	7	14
Concrete reinforc. bars	162	365	527
Hollow bar, drill steel	63	100	163
Bars, solid or hollow	1,385	2,188	3,573
Iron slabs	.....	.....	.....
Iron bars	79	50	129
Wire rods	711	1,196	1,907
Boiler and other plate	.....	.....	.....
Sheets, skelp, saw plate	96	171	267
Die blocks or blanks	2	.....	2
Tin plate, taggers' tin and terne plate	12	3	15
Structural shapes	2,412	3,534	5,946
Sashes and frames	5	.....	5
Sheet piling	.....	.....	.....
Rails and fastenings	146	241	387
Cast iron pipe and fitgs.	100	32	132
Malleable iron pipe fitgs.	15	.....	15
Welded pipe	217	270	487
Other pipe	1,137	6,550	7,687
Cotton ties	.....	2	2
Other hoops and bands	1,670	1,894	3,564
Barbed wire	1,654	1,012	2,666
R'nd iron and steel wire	282	285	567
Telegraph, telephone wire	.....	1	1
Flat wire and steel strips	166	270	436
Wire rope and strand	134	240	374
Other wire	251	240	491
Nails, tacks and staples	796	553	1,349
Bolts, nuts and rivets	6	12	18
Horse and mule shoes	63	45	108
Castings and forgings	94	224	318
Total (gross tons)	17,736	24,331	42,067
Iron and steel scrap	1,413	3,333	4,746
GRAND TOTAL	19,149	27,664	46,813

(1) Manganese content; (2) chrome content; (3) silicon content; (4) alloy content.

Machinery Exports Down 12 Per Cent in February

■ February industrial machinery exports, valued at $20,752,939, were 12 per cent lower than in February, 1938, at $23,631,271, according to the machinery division, department of commerce. Losses were noted in all major groups except mining, well and pumping equipment.

Power-driven metalworking equipment exports were valued at $7,832,893, compared with $9,459,830 a year ago, a decline of 17 per cent. Shrinkage was fairly uniform in all classes, except for slight increases in vertical boring mills and chucking machines, milling machines, planers and shapers and machinery for forging.

Power generating equipment, except electric and automotive, dropped 35 per cent, from $1,359,301 a year ago to $876,963 in February. Construction and conveying equipment lost only 4 per cent last year. Mining, well and p ing equipment gained 7 per from $4,674,442 to $4,985,230. tile, sewing and shoe mach declined 2.5 per cent.

MEETINGS

REINFORCING STEEL GROU ARRANGES PROGRAM

■ PROGRAM for the fifteenth nual meeting of the Concrete I forcing Steel institute at the F Hills hotel, Augusta, Ga., April 2 will feature an address, "Fu Needs for Construction," by A Temple, National City bank, York. A. E. Lindau, chairman o institute's committee on enginee practice, will review the rese program under way at Lehigh versity.

J. Ralph Fenstermaker will line the advertising and promo campaign for the current year. officers will be elected. The an golf tournament will be April 21.

ELECTRICAL ENGINEERS P CONVENTION IN HOUSTON

American Institute of Elect Engineers will conduct a South district meeting and student bra convention at Rice hotel, Hous Tex., April 17-19. One feature be a symposium on electricity pipe line corrosion. H. H. Hen 33 West Thirty-ninth street, N York, is institute secretary.

Offer Process To Make Standard Concrete Shap

■ Mass production methods w resulting lower cost and standard tion in sizes and quality will be m available to concrete shape ma facturers through a process ow by the newly-organized Cemenst Corp., Pittsburgh.

The company will not manu ture precast concrete products will supply its patented equipm to licensees in designated areas w will make products according to corporation's standards.

Cemenstone's process is said to similar to methods employed in steel plant in its mass product ability, and adaptability to produ many shapes and sizes. Molds interchangeable.

Equipment consists of a rigid st frame over a curing chamber wh produces a temperature of 160 grees Fahr. A hopper, which f the molds with concrete mixed a plastic state, rides on top of t frame, with vibrators which agit the mix. After hardening, the shap may be removed easily and sto for curing. The short-span slabs a

nforced with ⅜-inch rods welded metal fabric mesh to form a ss.

Chairman of the new corporation W. P. Witherow, founder of therow Steel Corp. and president, w-Knox Co. Leslie M. Johnson, mer vice president and general nager, A. M. Byers Co., is presint, and Albert Henderson, who veloped the process, is consulting gineer.

evelops Molybdic Oxide riquets for Alloying

Climax Molybdenum Co., Langeth, Pa., has announced a molybdic ide briquet for alloying iron and el. Briquets are 5-pound cylinders, ½ x 4½ inches, composed of a ixture of technical molybdenum ioxide and a sulphur-free pitch nder. Each contains 2½ pounds olybdenum.

The briquets were developed prilarily to provide an economical and nvenient means of making addibns of molybdenum to cast iron in e cupola, electric furnace or air rnace. They also are said to proide advantages as a means of lding molybdenum to steel.

Proportions of molybdenum and rbon are such that the briquets re self reducing. At the temperare of molten iron or steel, molybenum trioxide is reduced by the rbon, first to one of the suboxides f molybdenum, and then progresvely through the lower oxides of etallic molybdenum, which are abrbed by the metal in the bath. arbon dioxide passes off as a gas. here is said to be no carbon pickp by the metal in the bath.

Briquets also are intended for diect addition to the cupola or furace charge; they are not suitable or making ladle additions. When lectric or air furnaces are used, riquets can be added either to the old charge or when the bath is nolten. They also can be added ither to cold charges of steel or to he molten bath.

Seek Methods To Increase Sales Of Gas Fuel in Industrial Field

■ MEANS by which industry, metalworking plants in particular, can utilize gas more extensively in its heating operations, were considered by public utility representatives and equipment manufacturers March 27-28 at Hotel Statler, Cleveland. This annual sales conference of the industrial gas section, American Gas association, was attended by more than 160 executives, engineers and salesmen.

Some idea of the importance of industry as a user of gas is gained from a study of estimated sales figures for 1938. Residential consumption was 598,638,000,000 cubic feet, while 964,160,000,000 cubic feet went to nonresidential use. Thus the latter, which includes industrial consumption, represents 61.6 per cent of the total. Sales on a dollar basis amounted to $536,990,000 for residential uses, and $249,586,000 for nonresidential uses, the latter representing only 31.8 per cent of the total. This is explained by lower rates for commercial and industrial applications.

The figures include both natural and manufactured gas.

Urges Articulate Business

Discussing economic conditions at a luncheon on the first day, W. E. Whipp, president, Monarch Machine Tool Co., Sidney, O., and president, National Machine Tool Builders' association, asserted that business men are not sufficiently articulate, being prone to "take it on the chin," either because of indifference, diffidence, concentration in their own affairs, or fear.

Many problems must be solved, he said, first and foremost being unemployment, the result, not of the machine, but of a disturbed world and a disordered economy. Machinery and industry cannot effect a solution alone, Mr. Whipp continued. Only as productive enterprise is permitted to survive and prosper unhampered by confiscatory taxes, throttling governmental regulation and activities of theorists and pressure groups; only as science and invention are permitted to open new fields for enterprise; only as new products and new uses for old products are developed, can we take up our share of surplus manpower and contribute to progress.

The course of action, he pointed out, is: (1) To forget panaceas, either political or economic, and proceed on sound principles; (2) to build a defense against subversive attacks; and (3) to determine whether the approach to sales is shaped to result in real service to prospects and to the world.

A number of papers and addresses dealt with new applications for gas, more efficient utilization of the fuel, rates, and sales methods. On the second day, panel discussions were devoted to ferrous metals, nonferrous metals, ceramics, food industries, and industrial and commercial air conditioning.

Among the new and expanding uses for gas is that of supplying fuel for immersion tube boilers and water heaters, a development of the past eight years, according to O. N. Sellers, Sellers Engineering Co., Chicago. In these units, gas is burned in tubes which are surrounded with water. Today, immersion boilers and water heaters are at least 80 per cent efficient. Mud and lime settles below all heating surface in the form of a silt and is removed easily from the units by blowing or draining from the bottom. By dropping the lime and mud below all heating surface the relative efficiency of the boiler re-

(*Please turn to Page* 59)

■ Sales of industrial gas were discussed by this group meeting in Cleveland last week

Editorial

Businessmen Should Encourage Reform

■ WHAT does the average metalworking company think about the future? To obtain an answer to this question, STEEL has made a survey of 74 companies which represent a typical cross-section of American industry.

Of these 74 companies (see page 15), 51 said that they have plans for plant improvements. Total expenditures would come to $7,411,000. Of this, $1,217,500, or 16.4 per cent, is to be spent without delay. The remaining 83.6 per cent is held up because of "unfavorable government policies," "unfair labor law," "unsound tax system," "high taxes," "uncertainty over immediate outlook for business," "inability to borrow money."

This sample appears to indicate that the average American industrial company now has plans for spending close to $100,000 for plant improvements but that it is going to spend only $16,452 of this amount immediately.

Thus, business confidence is growing. It requires little conjecture to reach the conclusion that an exhibition of real government encouragement to business, in the form of more favorable laws and policies, is all that is required to raise the business level to one of prosperity.

Failure of Businessmen To Impress Congress Holds up Tax Reform

What is the likelihood that the present congress will give tangible evidence of a desire to encourage business? The answer is that the moves in this direction in the main are of a faltering character. Administration and congressional leaders who have definite remedial plans in mind are having difficulty in arousing enthusiasm for them.

It now is becoming evident that one of the real reasons for the hesitant attitude is that congress does not have a clear-cut impression that the recommended reforms really are desired by industry and would definitely have the effect of stimulating business.

This is the case with reference to taxes. It is not at all certain that the plan to eliminate taxes on undistributed earnings, capital stock and excess profits, and to remove minor irritants, will be pushed to a satisfactory conclusion. Prevailing opinion at Washington is that industry is only lukewarm on the proposed changes, for the reason that the elimination of these taxes would be accompanied by an increase in the tax rate so that total taxes would come to the same amount or a little higher.

Congress Must Be Educated as To What Makes Business Go

This impression, of course, is unfounded. But it reflects the fact that businessmen are failing to do the educational work that is required to bring about a general understanding as to what is necessary to stimulate business and enable it to put more people on its payrolls.

In his contribution to STEEL'S Forum on Re-employment (STEEL, March 27, page 38), Henry Buker, vice president, Brown & Sharpe Mfg. Co., Providence, R. I., mapped out a course of action by which industry can work its way out of its present difficulties. He points out that difficult conditions are not new to industry. He recommends good advertising and salesmanship: First, to educate congressmen and senators now in Washington to a more sane way of looking at their problems; second, to use their influence as far as possible in the future to see that only the right kind of men are elected to represent them.

STEEL believes with Mr. Buker that industry must follow this formula effectively if it is to contribute as it should toward its own future and that of the country.

The BUSINESS TREND

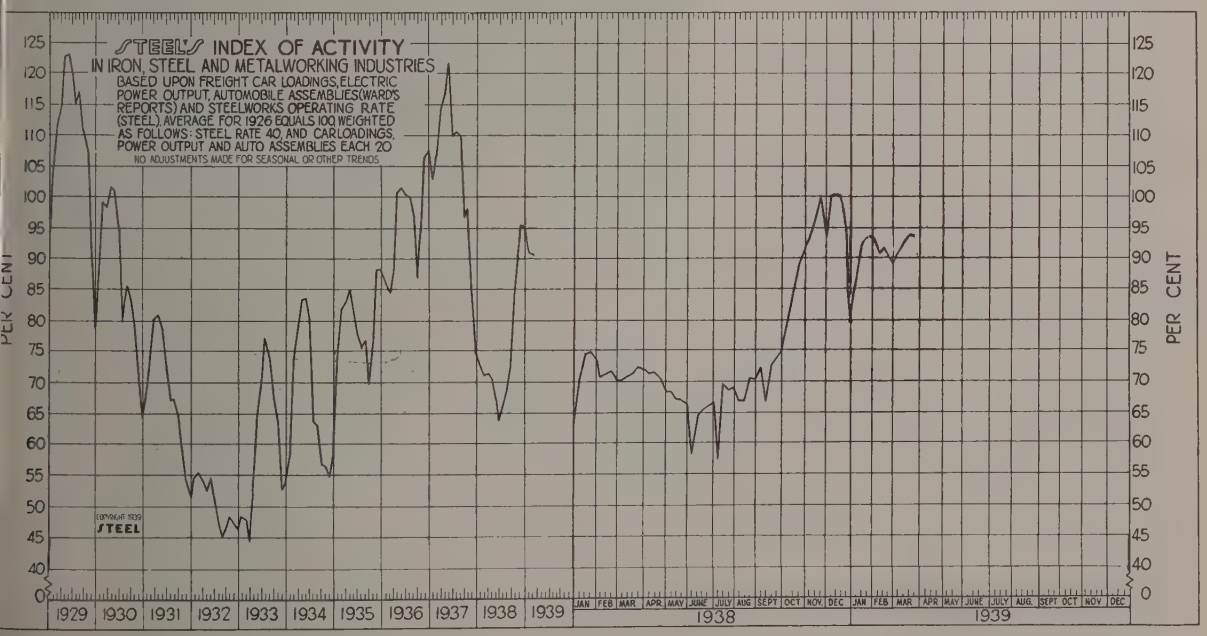
ctivity Index Hovers round Year's Peak

INDUSTRIAL activity remained substantially unanged in the week ended March 25. STEEL's index of ivity in the iron, steel and metalworking industries w stands at 93.2, compared with 93.3—the high point 1939—recorded in the previous week. The current lex number of 93.2 is substantially above the 72.4 ablished in the same week last year.

Automobile production during the week ended March continued its steady seasonal advance. Output inased for the fourth consecutive week to 89,400 units. This compares with 86,725 in the preceding week and is approximately 57 per cent above the 56,800 units assembled in the same week last year. Since the low point this year during the week ended Feb. 25, assemblies have recorded an average weekly increase of 3435 units. Early estimate of the February sales of about 163,000 units would indicate an increase of approximately 36 per cent over those of last year. For the first ten days of March factory reports indicate a continuation of the general seasonal upward trend in sales.

Steelmaking operations during the week ended March 25 eased one point to 55.5 per cent, thus reverting to the level during the latter part of February. This recent decline also represents the first set-back in steelworks operations since the week ended Jan. 21. A year ago the national steel rate stood at 35.0 per cent.

Electric power consumption during the week ended


STEEL'S INDEX OF ACTIVITY
IN IRON, STEEL AND METALWORKING INDUSTRIES
BASED UPON FREIGHT CAR LOADINGS, ELECTRIC POWER OUTPUT, AUTOMOBILE ASSEMBLIES (WARD'S REPORTS) AND STEELWORKS OPERATING RATE (STEEL). AVERAGE FOR 1926 EQUALS 100. WEIGHTED AS FOLLOWS: STEEL RATE 40, AND CARLOADINGS, POWER OUTPUT AND AUTO ASSEMBLIES EACH 20
NO ADJUSTMENTS MADE FOR SEASONAL OR OTHER TRENDS
PER CENT
1929 1930 1931 1932 1933 1934 1935 1936 1937 1938 1939
1938
1939

STEEL'S index of activity declined 0.1 point to 93.2 per cent in the week ended March 25:

Week ending	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
n. 7	86.5	70.1	107.8	90.2	65.4	53.6	45.3	55.8	69.2	88.1	94.8
n. 14	91.9	74.4	106.7	89.3	73.8	58.1	48.6	56.2	72.1	91.8	104.2
n. 21	93.0	74.7	104.0	86.0	78.1	60.9	49.8	55.8	72.9	96.3	107.5
n. 28	92.9	73.8	99.6	86.5	79.5	62.3	50.8	56.2	72.9	97.4	109.8
b. 4	90.7	70.9	100.8	83.8	81.8	66.9	49.9	56.0	74.9	100.8	111.3
b. 11	92.1	71.2	101.9	85.9	82.7	70.7	48.7	55.5	75.4	100.9	111.7
b. 18	91.1	71.9	108.8	81.8	82.8	72.4	48.3	54.5	76.0	97.7	112.6
b. 25	89.3	70.3	112.8	83.4	80.5	75.5	46.0	55.1	75.8	99.7	109.2
ar. 4	91.5	70.1	117.9	87.7	81.1	76.8	47.4	54.1	79.2	98.3	113.5
ar. 11	92.7	70.8	112.7	89.7	82.0	78.6	43.4	54.8	80.6	97.5	114.8
ar. 18	93.3	71.3	113.1	86.0	84.0	79.9	42.7	54.4	81.3	98.1	115.0
ar. 25	93.2	72.4	114.0	91.2	84.0	79.7	44.6	53.5	80.6	99.6	115.0

March 25 eased seasonally to 2,198,681,000 kilowatt-hours. This represents the third weekly decline for this industrial indicator, but output still remains substantially above that of the corresponding week last year, when production stood at 1,975,239,000 kilowatt-hours. Despite the decline during the week ended March 25, the year-to-year gain has widened to a new 1939 peak.

Revenue freight carloadings registered an encouraging increase during the week ended March 25 to the highest level of the year. Freight traffic in that week was placed at 605,462, an increase of 10,894 cars over the preceding week. It compares favorably with the 572,952 cars loaded in the corresponding week of 1938.

PRODUCTION UNCHANGED DURING FEBRUARY

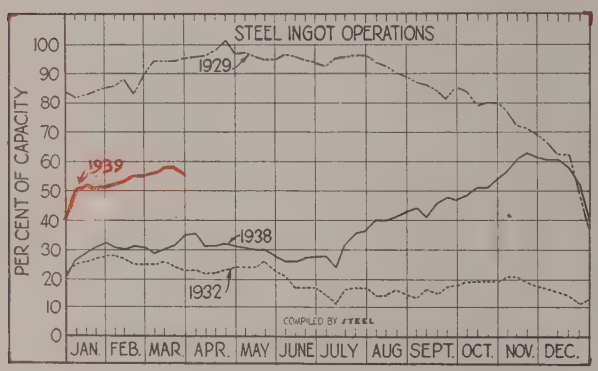
Failure of industrial production to record the normal seasonal improvement during February forced the Federal Reserve board's seasonally adjusted index to decline three points to 98 per cent for the month. In February of last year the index stood at 79. However, in the first three weeks of March, industrial activity showed seasonal increases, which would indicate that the seasonally adjusted index will remain substantially unchanged for last month. Factory employment and payrolls increased somewhat less than is usual between the middle of January and the middle of February, while distribution of commodities to consumers remained at about the same volume in February as in January. Commodity prices continued to show little change during February.

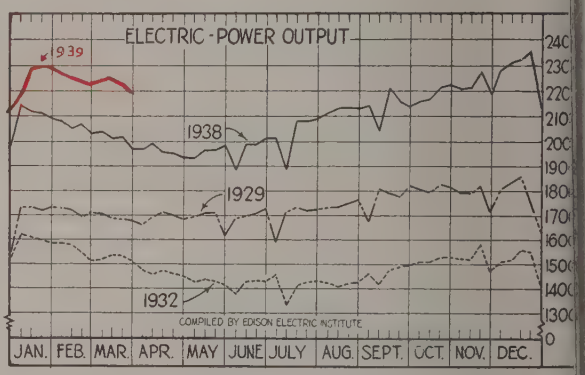
AUTOMOBILE OUTPUT DECLINES SEASONALLY

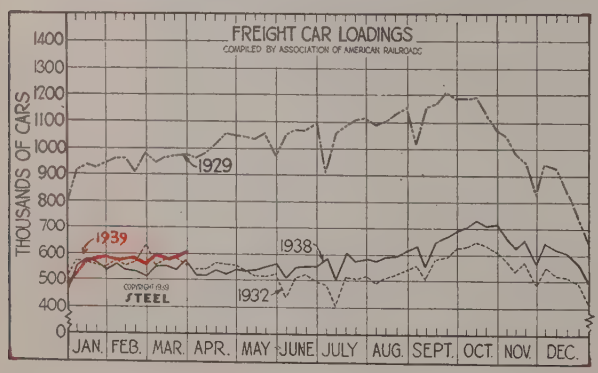
Production of automobiles, including passenger cars and trucks, in the United States and Canada, declined 41,805 units to 312,141 during February, but remained substantially above the 202,589 units assembled in the corresponding months last year. A substantial improvement in automobile production from the moderate lower levels during January and February is indicated for March. Early estimate of 390,000 units produced during March represents a still further increase over the comparable month of last year.

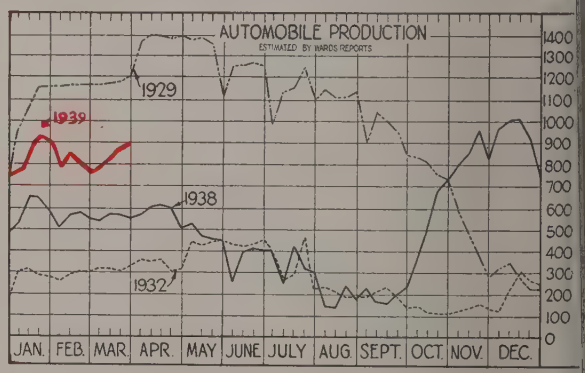
COMMERCIAL FAILURES DECREASE SHARPLY

Commercial failures during February recorded a sharp decline from the January level. The 963 disasters in February, with liabilities of $12,788,000, represent a decrease of 23.8 per cent from the 1263 failures in January with liabilities of $19,122,000. In the comparable month last year failures numbered 1149, with liabilities totaling $21,028,000.

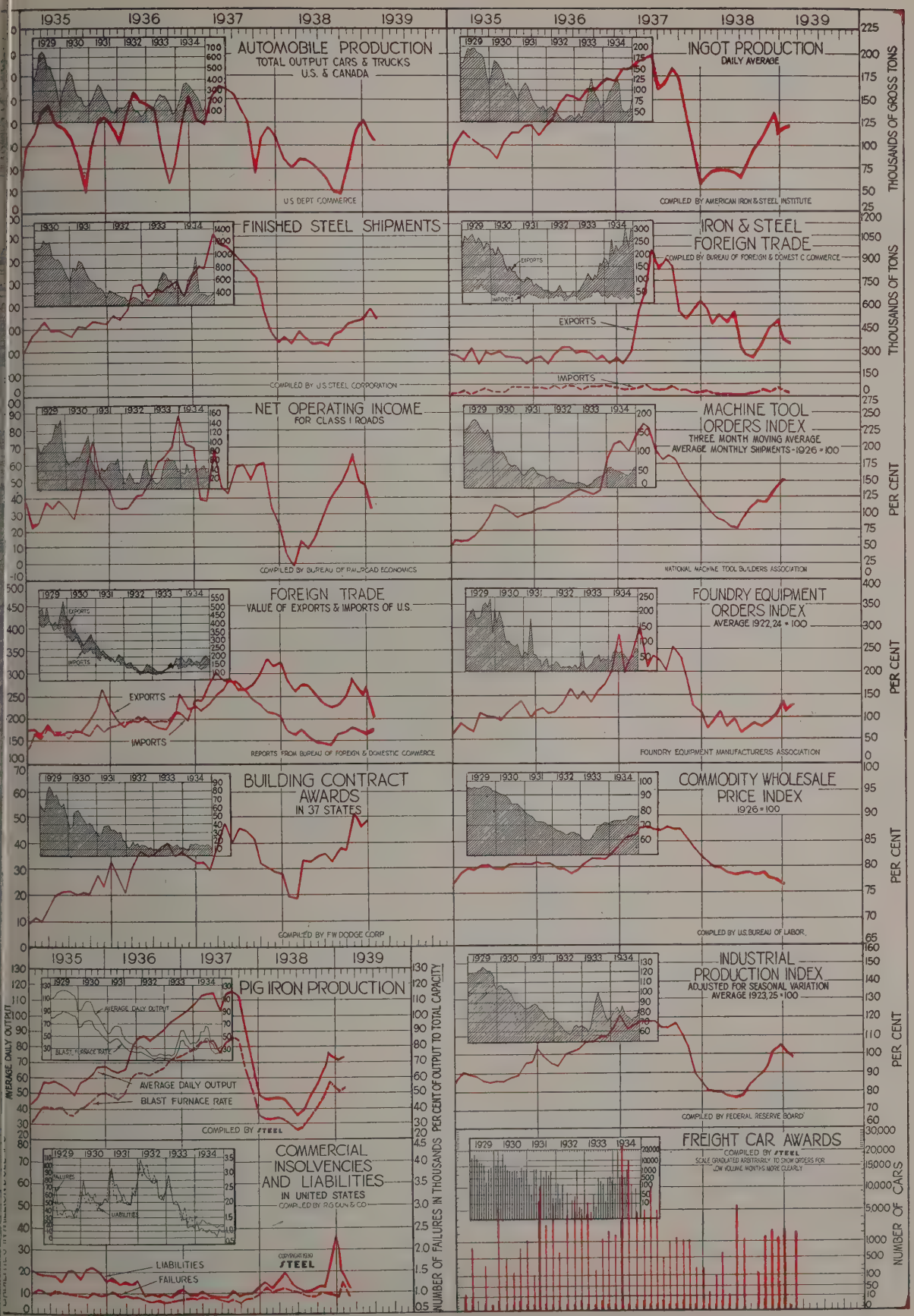








Week ending	Steelworks Operating Rate Per Cent 1938	1932	1929	Electric Power Output Million KWH 1938	1932	1929	Freight Car Loadings Thousands of Cars 1938	1932	1929	Weekly Auto Output 1938	1932	1929
Dec. 17	58.0	14.0	63.5	2,332	1,563	1,841	606	517	923	102,902	30,589	33.3
Dec. 24	52.0	12.0	63.5	2,362	1,554	1,860	574	495	843	92,890	27,396	23.3
Dec. 31	40.0	13.0	38.5	2,120	1,415	1,638	500	407	638	75,215	25,598	23.9
	1939	1938	1932	1929	1939	1938	1932	1929	1939	1938	1932	1929	1939	1938	1932	19
Jan. 7	51.5	26.0	25.0	84.0	2,169	2,139	1,619	1,542	531	552	573	799	76,685	54,084	30,755	75.(
Jan. 14	52.0	29.0	26.0	82.0	2,269	2,115	1,602	1,734	587	580	572	914	86,925	65,735	31,416	95.(
Jan. 21	51.5	30.5	27.0	83.0	2,289	2,108	1,598	1,737	590	570	562	932	90,205	65,418	29,365	105.(
Jan. 28	51.5	33.0	28.5	84.0	2,292	2,098	1,588	1,717	594	553	560	926	89,200	59,365	28,950	115.(
Feb. 4	53.0	31.0	28.5	85.0	2,287	2,082	1,588	1,728	577	564	575	947	79,410	51,443	27,110	116.(
Feb. 11	54.0	30.0	27.0	86.0	2,268	2,052	1,578	1,726	580	543	562	956	84,500	57,810	29,320	116.(
Feb. 18	55.0	31.0	25.0	88.0	2,249	2,059	1,545	1,718	580	536	572	958	79,860	59,100	30,410	116.5
Feb. 25	55.0	30.5	25.0	83.0	2,226	2,031	1,512	1,699	561	512	636	907	75,660	56,977	30,150	116.5
Mar. 4	56.0	29.5	25.0	89.5	2,244	2,036	1,519	1,707	599	553	560	977	78,705	54,440	31,390	116.5
Mar. 11	56.5	30.0	25.5	94.5	2,238	2,015	1,538	1,703	592	557	575	946	84,095	57,438	31,110	116.5
Mar. 18	56.5	32.0	24.5	94.5	2,225	2,018	1,537	1,687	594	540	585	958	86,725	57,558	30,590	117.(
Mar. 25	55.5	35.0	23.0	94.5	2,199	1,975	1,514	1,683	605	573	561	961	89,400	56,800	32,892	117.5


1935
1936
1937
1938
1939
AUTOMOBILE PRODUCTION
TOTAL OUTPUT CARS & TRUCKS
U.S. & CANADA
U.S. DEPT COMMERCE
INGOT PRODUCTION
DAILY AVERAGE
COMPILED BY AMERICAN IRON & STEEL INSTITUTE
THOUSANDS OF GROSS TONS
FINISHED STEEL SHIPMENTS
COMPILED BY U.S. STEEL CORPORATION
IRON & STEEL
FOREIGN TRADE
COMPILED BY BUREAU OF FOREIGN & DOMESTIC COMMERCE
EXPORTS
IMPORTS
THOUSANDS OF TONS
NET OPERATING INCOME
FOR CLASS I ROADS
COMPILED BY BUREAU OF RAILROAD ECONOMICS
MACHINE TOOL
ORDERS INDEX
THREE MONTH MOVING AVERAGE
AVERAGE MONTHLY SHIPMENTS - 1926 = 100
NATIONAL MACHINE TOOL BUILDERS ASSOCIATION
PER CENT
FOREIGN TRADE
VALUE OF EXPORTS & IMPORTS OF U.S.
EXPORTS
IMPORTS
REPORTS FROM BUREAU OF FOREIGN & DOMESTIC COMMERCE
FOUNDRY EQUIPMENT
ORDERS INDEX
AVERAGE 1922,24 = 100
FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION
BUILDING CONTRACT
AWARDS
IN 37 STATES
COMPILED BY F.W. DODGE CORP
COMMODITY WHOLESALE
PRICE INDEX
1926 = 100
COMPILED BY U.S. BUREAU OF LABOR
PIG IRON PRODUCTION
AVERAGE DAILY OUTPUT
BLAST FURNACE RATE
COMPILED BY STEEL
INDUSTRIAL
PRODUCTION INDEX
ADJUSTED FOR SEASONAL VARIATION
AVERAGE 1923,25 = 100
COMPILED BY FEDERAL RESERVE BOARD
COMMERCIAL
INSOLVENCIES
AND LIABILITIES
IN UNITED STATES
COMPILED BY R.G. DUN & CO.
LIABILITIES
FAILURES
COPYRIGHT 1939
STEEL
NUMBER OF FAILURES IN THOUSANDS
PER CENT OF OUTPUT TO TOTAL CAPACITY
FREIGHT CAR AWARDS
COMPILED BY STEEL
SCALE GRADUATED ARBITRARILY TO SHOW ORDERS FOR
LOW VOLUME MONTHS MORE CLEARLY
NUMBER OF CARS

Universal Fatigue Tester

Design, materials and production of automotive parts are tested under normal plus abnormal loads to assure against possibility of failure in service. Unit described here makes both constant "strain" and constant "stress" tests

By F. BUCKINGHAM
Vice President
The Magnetic Gauge Co.
Akron, O.

■ A TESTING machine with an electric eye to guide its strokes is battering out new data on the endurance of Ford V-8 car and truck parts for Ford Motor Co. engineers. The machine, described by an engineer as "a million miles of rough road in a 10-foot box," subjects Ford parts in a few hours to all the stresses and strains they would meet in years of ordinary use.

A universal fatigue testing machine was required on which any part from a motor car or truck could be attached and tested to failure. It was to be of the reciprocating type with adjustable stroke. The moving head must exert a maximum plus and minus force of 3000 pounds and the force had to be indicated accurately while tests were being made at speeds of 5 to 400 strokes per minute.

A further and important requirement was that this be in effect a constant "stress" machine rather than constant "strain." Dead weight machines are of the constant stress type but are difficult to construct for such loads. In constant strain machines, as cracks develop and part begins to weaken, the ac load (stress) drops off. So this chine was to be constructed to a matically extend its stroke maintain the load or stress on part at the present value until mate failure.

Engineers of Baldwin-Southv Corp., Philadelphia, developed unique and versatile machine m ing these requirements, as wil evident from the following des tion.

Every manufacturer of motor carefully investigates the failur parts in service. They wish as ance that there will be no fu failures due to design or manu

Abstract from article in "Baldwin-Southwark" magazine published by Baldwin-Southwark Corp., Philadelphia.

Fig. 1—Torsional fatigue tests of welds on 2¾-inch round pipe to copper-silicon iron

Fig. 2—This is a fatigue test se for use in checking a spindle

error, weak materials or un-
vn service stress. To have such
rance they maintain large
ratories equipped with elaborate
exact apparatus in which ma-
ls and processes are investi-
d.

dling tests, compression tests,
ring, hardness, twisting, impact
fatigue tests—all are used in
selection of materials and de-
s. But one further step in the
ratory is necessary to insure
ble-free service. Parts must be
d under maximum, plus service
itions, to determine what com-
tion of material and design will
d the "gaff," since it is well
vn that cars, trucks and busses
frequently overloaded, or if not
loaded they are otherwise
ed and receive unforeseen
ks and stresses which cause
ires.

universal fatigue testing ma-
e, as assembled in the Baldwin-
thwark shops in Fig. 3, has the
ng door open to show the fly-
el and mechanism for stroke
istment. At the extreme right is
vn the box containing the elec-
al load indicating and maintain-
mechanism. On the machine
er are push buttons for start and
, a speed indicator, and below it
andwheel for speed regulation;
le below the flywheel is a project-
lever for shifting from slow to
t speeds or vice-versa.

Operating Mechanism Enclosed

The machine is operated by a
tor directly coupled to a variable
ed transmission which is con-
ted, by means of V-belt drive, to
2-speed gear shift which drives
flywheel. A connecting rod is
ustably attached to the flywheel
l pinned to a reciprocating slide
ich runs in horizontal ways in the
sing. All of this operating mech-
m is fully enclosed.

ttached within the slide by
ans of a pin is a tension-compres-
n weighing ring similar to those
d in calibrating testing machines.
e lug on the opposite side of this
g is attached to a work head from
ich connection is made to speci-
ns to be tested. Several different
es of connections are shown in
s. 1, 2, 4, 5 and 6.

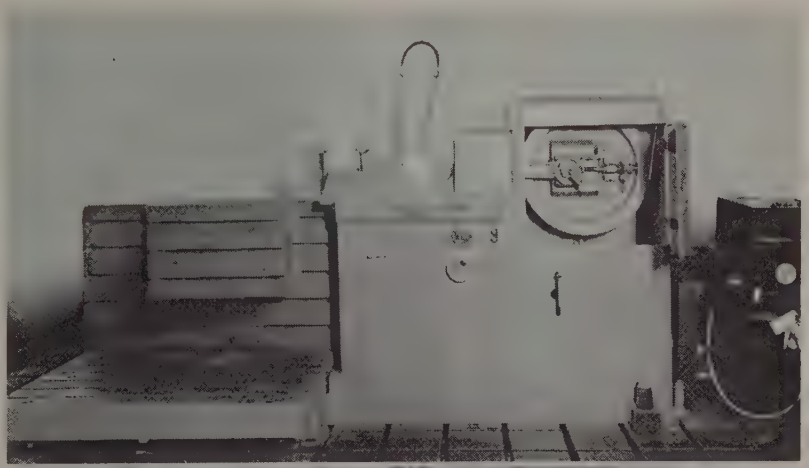
The work-head is flexibly held to
slide in the direction of the re-
rocating motion but rigidly held
other directions. As resistance
motion is exerted by the speci-
n, the force is transmitted to the
rk-head and thence to the weigh-
ring. The ring deforms in pro-
portion to the force exerted and this deformation operates an inductor telemeter which causes a light beam to travel across a scale graduated in pounds, thus indicating the force or load exerted on the specimen. This force is exerted in both directions when the set-up is such as to apply deformation to the part in both directions. Consequently when a test is being made, a band of light extends across the scale from plus to minus, the limits of which indicate the plus and minus load.

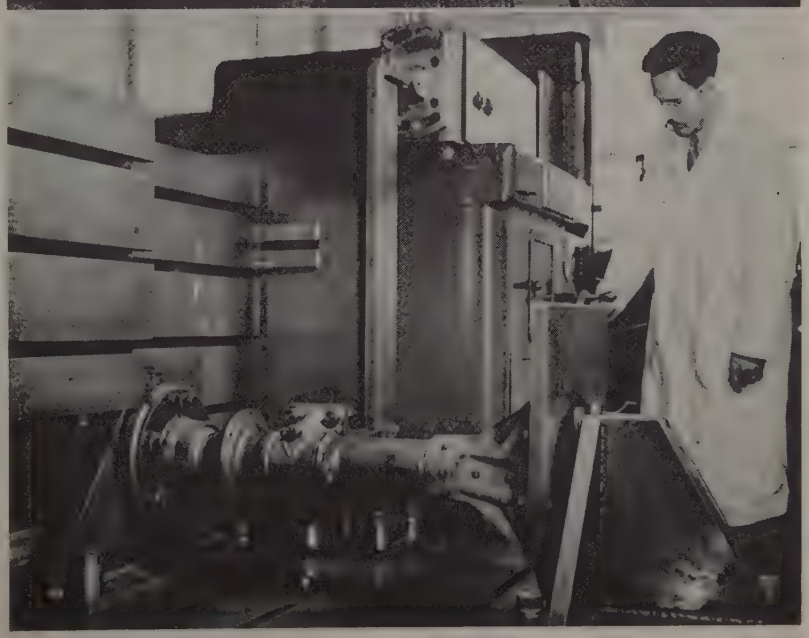
Means are provided to lock the work-head to the slide when it is desired to only deform the specimen through a constant distance cycle without regard to the load or its maintenance.

A most important feature of the machine was to be its ability to maintain the load applied at the start of the test even as the specimen weakened through the gradual development of incipient cracks. To accomplish this, a unique type of crank adjustment mechanism was designed.

Through the open door of the cover can be seen the flywheel and crank with its screw adjustment mechanism. Using a hand wrench, desired settings for load or stroke can be made before the machine is started. To maintain the load, a mechanism on the opposite side of the flywheel is provided, so arranged that when the light beam on the scale falls below the predetermined load the crank adjustment screw is turned slightly at every revolution of the flywheel until the stroke is increased sufficiently to bring the load back to its original value, and restore the light band to its original limits.

If specimens of unequal strength in the opposite sides, or parts that are unsymmetrical and thus show failure in one direction more rapidly than the other, are tested, provision can be made in this type of machine to increase the stroke by load





g. 3. (Upper)—View of testing achine with door showing internal echanism. Fig. 4. (Lower)—Truck le housing set up for a transverse fatigue test

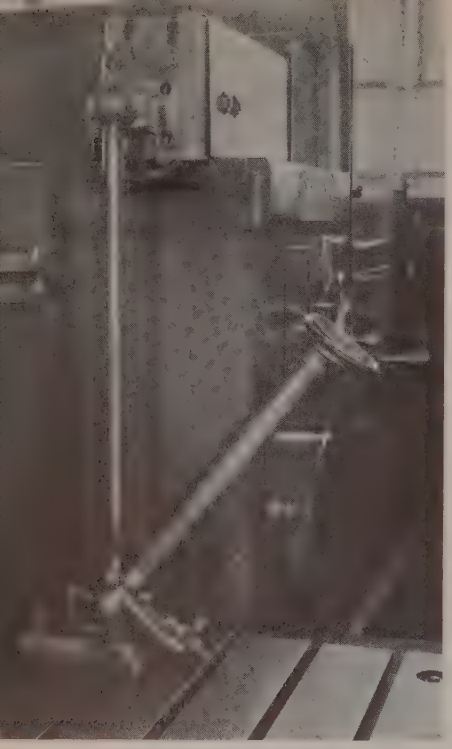


Fig. 5—Fatigue test on rear radius rod assembly

changes from either side or both sides as desired.

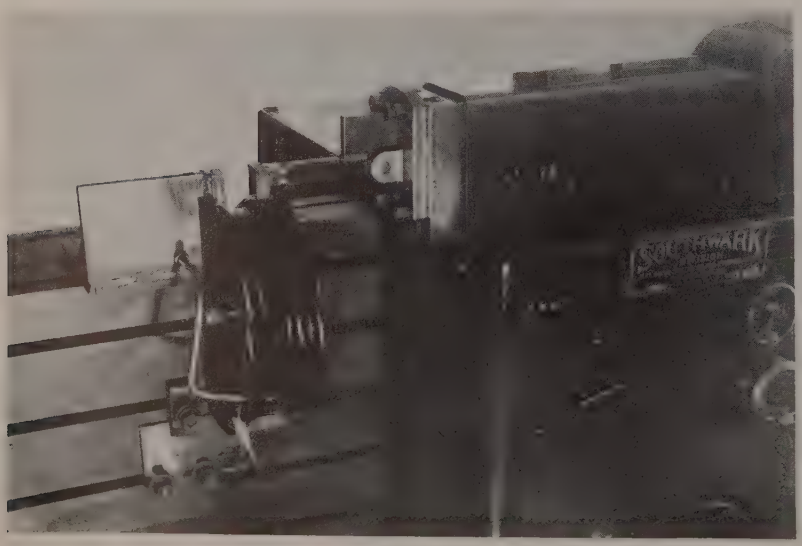
Still another necessary feature is incorporated. The inertia of connecting members between ring and specimen must be counterbalanced. The set-up for testing the front spindle, Fig. 2, shows a connection from the spindle to the work-head and a block on the head. These parts together with the work-head and one-half the weighing ring constitute a mass with considerable inertia when rapidly reciprocated. This will appear as a load on the specimen if it is not properly compensated. However, provision is made whereby the adjustment of a weight on a simple lever balances out this inertia effect when the machine is run idle at the speed and stroke desired, with the connecting parts attached to the work-head but detached from the specimen.

Five illustrations of typical tests are shown. Four are parts tests, while the fifth is an investigation of weld efficiency under reverse torsions and between tubes of different metals.

In the truck axle housing transverse test, Fig. 4, it will be noted that the force of the work-head is multiplied through a lever pinned to a block on the base. In this test the leverage is 5 to 1, so a load of 2500 pounds through the weighing ring applied 12,500 pounds to the truck housing. These typical tests illustrate how loads of tension, compression, transverse or torsion can be applied. Through suitable leverages they can be multiplied to values considerably above the weighing ring capacity of 3000 pounds.

Loads can be applied at constant stroke until failure, or with automatically increasing stroke to maintain constant load until failure. Loads can be controlled automatically on unsymmetrical parts or on parts that are weaker in one direction than the other. The inertia effects of the necessary heavy connecting parts between ring and specimen can be easily counterbalanced. Altogether it is an extremely versatile machine duplicating road conditions, plus.

Fig. 6—Wheel rims undergoing fatigue test



How Can Government Best Be Reorganized?

■ *Reorganization of the National Government*, by Lewis Meriam and L. F. Schmekebier; cloth, 272 pages, 5¼ x 8¼ inches; published by the Brookings Institution, Washing supplied by STEEL, Cleveland, for in Europe by Penton Publishing Ltd., Caxton House, Westmins London S.W.1.

The objective of this volume i present a general analysis of p lems involved in reorganizing executive branch of the natio government, to consider the po bilities and the limitations of eral proposed types of reorgan tion and the arguments for against them and to offer sug tions as to possible procedures.

The first part is devoted to an alysis of the problem, which handled by Mr. Meriam. The ond part is a history of reorgan tion efforts, by Mr. Schmeckeb After defining certain major cepts of reorganization the aut gives factual background as to sible reductions in government penditures that may be reasona expected to result. Various pro als for structural reorganization described, with possible eliminat of overlappings, duplications conflicts.

An important chapter is devo to consideration of curtailment functions and activities. This siders the question of enlarged trol by the President and lesse authority of congress and courts. This section then summ izes by three major questions: W is necessary if substantial expe ture reduction are to be ma What are the devices for secur economy and efficiency? Is a spe reorganization bill necessary?

The second part deals with history of past efforts at reorgan tion. Appendices contain much tual information as to existing eral agencies and establishme their budgets and expenditures. index is provided.

Plating Process Has High Cathode Efficienc

■ Claimed to be four times as as conventional copperplating p esses and to have 100 per cathode efficiency at high curr densities, a highspeed method been announced by E. I. du P de Nemours & Co., Wilmingt Del.

Deposits are said to be free fr pits and uniformly bright. Fin possesses good grain structure, be buffed and is suitable for eit bright or dull nickel deposits. takes only 10 to 20 minutes form coatings from 0.001 to 0.(inch thick. Cyanide decomposit is negligible, and obnoxious fun are eliminated by the process. can be installed in usual cyan plating equipment.

Here's where
UR SALES VOLUME
is finally determined

V

HETHER you make complete parts it is the individual customer's hat regulates your sales volume—

l more manufacturers are turning n Quality Cold Rolled Strip Steel y have discovered that products this versatile material have the eye-catching gleam that makes ecause they have found, also, that his material cuts costs.

Quality Cold Rolled Strip Steel wide range of finishes, edges, tem-lths. It is ideal for products or parts e light in weight, accurate in size smooth finish.

elp you. It has been our privilege ny customers in planning the eco-lication of Cold Rolled Strip Steel quirements. So why not put your to our engineers and metallurgists?

AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

Insulating Firebrick

Specifications for insulating firebrick at present appear somewhat confusing. The discussion of various physical and chemical properties of insulating firebrick as presented here may help clarify the factors involved

By W. RAYMOND KERR
Chief Ceramic Engineer
Armstrong Cork Co.
Lancaster, Pa.

■ ALTHOUGH relatively new, insulating firebrick rapidly is finding increasing application, in many instances outdistancing formation of adequate specifications. Already insulating firebrick has been specified for use to back up refractory walls and other installations ranging up to where it is directly exposed to the flame in high-temperature furnaces.

Physical and chemical properties of insulating firebrick vary widely and in some applications may be of great importance. Chemical composition is unimportant in most cases provided other properties of the brick enable it to withstand working conditions of the application. However, certain chemical characteristics should be kept in mind.

Where strongly reducing conditions are maintained, a low iron content should be specified, about 2 per cent for instance. Insulating firebrick as a class appears less likely to disintegrate under reducing conditions than are more dense refractories. This may be attributed to larger pore size of the insulating firebrick where the carbon granule deposited by the reducing atmosphere may have more room to grow before it finally exerts sufficient pressure to crack the structure.

Retarding Disintegration

Another factor that retards disintegration of light weight brick is its high permeability, permitting sufficient oxygen to enter to partly burn the carbon deposited within the brick.

While siliceous insulating firebrick may have somewhat more of a tendency to spall than fireclay insulating brick originally fired at the same temperature, there are a number of marked exceptions which indicate the silica content cannot be considered a deciding factor in the chemical constitution of insulating firebrick.

Specifying alumina is believed of little value in insulating firebrick as observations in actual practice have not confirmed the idea that a high alumina content makes a brick that has less tendency to spall.

Pyrometric cone equivalent (P.C.E.) usually is no indication of the useful range of an insulating firebrick. It merely serves as a guide to the refractoriness of the product. Insulating firebrick usually is much less dense than firebrick refractories and so reacts differently under similar temperature conditions.

A factor which determines the temperature at which insulating firebrick can be used is the temperature at which the brick is originally fired. This point is probably of greater importance than in the case of firebrick. Since actual pyrometric cone equivalent of any insulating firebrick is usually so greatly in excess of the firing temperature as to bear no direct relationship to it, it is of little importance in specifications. The greatest value of a pyrometric cone equivalent test in the case of insulating firebrick is as a factor of safety but not as a guide to the useful temperature range of any particular brand.

Bulk density is important from several angles and so should be included in all specifications. A saving in weight usually can be considered in designing a furnace and so produce savings in steel work.

Specific heats of various clay insulating firebricks are similar. this reason a brick of low bulk d ity has lower heat capacity and shows a greater saving in fuel t a brick of greater bulk density. A greater heat storage permits gr er flexibility in heating and cooli resulting in more heats per furn day with the lighter weight br

Low bulk density for any gi brick almost invariably means thermal conductivity. While does not necessarily mean the lig est weight brick is the best sulator, this usually is the c Thus, specifying a figure for b density may be of value.

If the insulating firebrick is back up a refractory, density sho be relatively low, perhaps 30 to pounds per cubic foot. For li duty service in average indust furnaces, a considerable range density may be permissible, inc ing values from 35 to 50 pounds cubic foot. Furnaces operated der relatively severe conditions require a higher density ranging to 65 pounds per cubic foot.

Made to Close Tolerances

Accuracy of dimensions may be considerable importance since m insulating firebrick is laid dry with thin joints to obtain low h losses. Modern production meth are quite accurate and permit m ing brick extremely close to size tolerance of 1/32-inch plus or mi is believed reasonable since the portance of accuracy in finishing a standard dimension appears q generally understood.

Porosity varies almost direc with bulk density. Thus, wher bulk density is specified, it is unn essary to mention pore size or p osity. Since the strength and ot properties required effectively li the pore size permissible in insu ing firebrick, specifying porosity

COPPER ALLOY BULLETIN

Reporting News and Technical Developments of Copper and Copper-Base Alloys

APRIL "Bridgeport" BRASS CO. 1939

RONZE PALNUTS USED IN ELECTRICAL EQUIPMENT

alnuts—made of Duronze*—are exten-ly used as lock nuts in many types of trical equipment for both railway and ustrial service. Typical applications are disconnect switches, clamps, bus fit-gs, and other parts where non-ferrous ts must be used for their electrical con-tivity and corrosion resistance.

Manufactured by The Palnut Company, ington, N. J., palnuts are provided with lient spring jaws that grip the root of bolt thread and provide spring tension inst the regular nut. Palnuts are ap-

ed to the bolts on top of the regular nuts, d are tightened with the fingers. A fur-er quarter-turn with a wrench locks em securely in place.

OPPER AND BRASS EXHIBIT AT NEW YORK WORLD'S FAIR

Copper & Brass Research Association

he copper and brass industry's exhibit at the New York World's Fair, which opens the end of this month, ll be housed in the Metals Building. The accompanying architectural rendering shows a part of the com-ete exhibit, which will include murals and dioramas tracing the history of copper through the ages, an imated copper "atom," methods of mining, and the use of copper for electrical applications.

HIGH-CONDUCTIVITY COPPER ALLOYS MEET SPECIFIC NEEDS OF ELECTRICAL INDUSTRY

Good Balance Can be Obtained between Conductivity and Other Properties

The electrical industry, which accounts for more than one-fifth of the total consumption of copper, finds increasing applications for this versatile metal in the form of alloys which give higher mechanical strength, corrosion resistance, or other needed characteristics without undue sacrifice of electrical conductivity.

In such applications as the windings of electrical machinery, where high conductivity in a minimum space is the basic requirement, pure copper is of course used almost exclusively. In many other electrical applications, it is necessary to effect a compromise between electrical conductivity and other properties.

The wide range in which the copper alloys are manufactured makes it comparatively simple to select an alloy that gives the best balance of characteristics. Brass is frequently used for the fabrication of many detail parts, because of the ease with which it can be stamped or molded into complicated shapes.

Phosphor bronze, because of its high resiliency, is very widely used for the fabrication of spring contacts. Duronze*, a silicon bronze developed by Bridgeport metallurgists, is frequently used in place of phosphor bronze for these applications, particularly as an economy measure. In its resistance to corrosion, Duronze is superior to many of the other copper alloys. A highly important advantage of Duronze in the manufacture of electrical hardware is the fact that bolts and nuts made from it can be used over and over again, as they have little tendency to deteriorate upon

(Continued on Following Page, Column 2)

Runners and Risers for Non-Ferrous Castings

A recent article in *Metal Industry* (London) discusses the use of runners and risers in casting various bronzes. According to the author, good results were obtained by casting small phosphor bronze parts four to a feeder. In this way the hottest metal was found at the desirable spot—the joint between runner and casting.

Manganese bronzes and high tensile brasses were found to require special care, because of their tendency to draw in unexpected places. This tendency may sometimes be overcome by running in the top part instead of the bottom. Risers for manganese bronzes should be cut so that the neck of the riser is as short as possible, and a long stream of metal should be avoided when pouring.

Westinghouse Electric & Manufacturing Company

A typical group of brushes and connectors formed from spring brass with necessary electrical and mechanical properties.

COPPER ALLOY BULLETIN

TYPES OF COPPER

This is the third of a series on the various types of copper, their relative merits and uses.

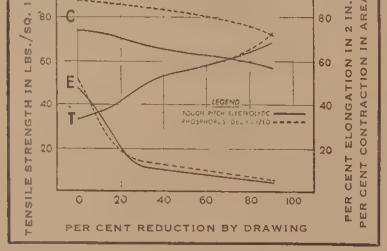
Further Effects of Presence of Oxygen

In addition to the effects produced in copper by the presence of oxygen, which were discussed in the March issue of the COPPER ALLOY BULLETIN, other differences must be noted between *Tough Pitch* and *Deoxidized Copper*. All Tough Pitch Copper castings have on one surface a segregation of cuprous oxide. In wire bars and flat cakes this surface is a large proportion of the total surface of the casting. This segregation of oxide in the set surface must be removed before the copper is suitable for polishing and severe drawing operations. Many refineries remove the set surface of wire bars by scalping before shipment. In the production of cakes for sheet this difficulty has been largely eliminated by the use of moulds which confine the set surface to an end or side of the cake rather than to one of the rolling surfaces.

Tough Pitch Copper, however, is superior to most Deoxidized Copper for purposes in which high electrical conductivity is essential, as in electrical wires and electrical devices generally. It is also slightly superior to Deoxidized Copper for machining operations.

Following is a comparison of the properties of Tough Pitch and Deoxidized Copper:

	Electrolytic Tough Pitch	*Phosphorus Deoxidized*
Specific Gravity—20° C.	8.89	8.89
Density, lbs./cu. in.	.3212	.3212
Melting Point—° C.	1083	1083
Linear Coefficient of Expansion/° F.	0.0000094	0.0000094
Electrical Resistivity—ohms/circ. mil. ft.	10.64	10.64–11.80
Electrical Conductivity—%	97.5 min.	97.5–87.0
Thermal Conductivity—%	100	90 (approx.)
Modulus of Elasticity—lbs./sq. in.	15,000,000	15,000,000



The accompanying curves give a comparison of the properties of Tough Pitch Electrolytic and Phosphorus Deoxidized Copper as affected by cold drawing.

Fabricators desiring information on the various types of copper or copper alloys in specific uses are invited to discuss their problems with Bridgeport Brass Company.

ELECTRICAL INDUSTRY

(Continued from Preceding Page, Column 3)

successive loosening and tightening, which is frequently made necessary by service requirements.

The electrical industry also makes wide use of the copper alloys for non-current-carrying applications, chiefly in the manufacture of household appliances, where attractive appearance is the important consideration. For such applications it is customary to use brass sheet, which must have a smooth surface and must be properly annealed to insure economical finishing operations. For both current-carrying and non-current-carrying applications, product quality and economy depend to a considerable extent upon the selection of the proper alloy and temper to meet the specific requirements involved. Bridgeport metallurgists will gladly assist in this selection.

Electrolytic Process Gives Wide Color Range

Almost every color of the rainbow can be produced electrolytically, without the use of colored lacquers, dyes, or pigments, by a process which varies the color simply by varying the length of time that the article remains in the plating bath. The composition of the plating bath is not changed in any way to effect the color variations.

In this process, an installation of which has been made at the plant of L. F. Grammes & Sons in Allentown, Pa., pure metallic copper is used as the anode and the plating deposit is cuprous oxide. The bath is operated at low voltage and current density, the desirable voltage being approximately 0.4 volts, and the current density about 0.5 amperes per square foot.

The color is the result of the reflection and refraction of light passing through the semi-transparent coating. As the thickness of the coating increases, the color changes from violet to blue, green, yellow, and red. With increased thickness of coating, the color cycle is repeated, and in each succeeding cycle the colors become darker, so that the process controls both the color and the tone.

Patents on the process are owned by Kansas City Testing Laboratory. Licenses are issued by United Chromium, Inc.

NEW DEVELOPMENTS

This column lists items manufactured developed by many different sources. Furth information on any of these items may obtained by writing the Bridgeport Br Company, which will gladly refer readers the manufacturer or other source.

A flexible sanding pad is molded of n breakable rubber. It is reported to be su able for feather edging or flat sanding. I available in three sizes.

A new lubricant is said to be especia suitable for conveyors operating in enamel and baking ovens and other high-temperat locations. It consists of colloidal graphite s pended in kerosene, which evaporates to le a thin deposit of the colloidal graphite.

A tube expander is designed for rolling copper or brass tubes into boilers, condens and similar equipment. It may be opera by hand or used with a power unit. It is ported to be especially suitable for tubes small diameter.

A vacuum lifter is designed for lift polished metal sheets without leaving smu marks. It uses vacuum rubber cups provid with release operated by a flick of the fing Available in models for light, medium, a heavy lifting.

A new plating barrel, which is intend for hot solutions, is said to employ a no method of exhausting fumes. A series of sm ducts directly over the anode rods conn with the main duct on the side, without int fering with the placement of the cylind in the tanks.

A sheet metal former is said to provid means of forming or flanging the edges sheet metal when the contour is so irregu that hand work would ordinarily be nec sary. Machine uses a short brake oscillat against a holding-down tool at speeds of or 500 strokes per minute. Each stroke bri up a small part of the sheet.

A congestion eliminator for steam ma uses a copper coil. A special rust eradicat product is introduced into the steam m through openings in valves.

Electric heaters with water-cooled el trodes may be used on non-ferrous metals upset and drop forge work. They are ava able in seven different models, differing pr cipally in capacity and number of electrod

A tube coupling is reported to be suita for maintaining tight joints on flared tub The addition of a locking nut is said to lieve undue strain on the flare. Couplir made from bar brass are intended for u with copper or other soft tubing. A seco series is suitable for use with hard copper with steel.

A marking hammer for bronze, brass, a other materials is electrically operated. It available with a diamond point for permane marking. Operates on 110 volts, 60 cycles.

PRODUCTS OF THE BRIDGEPORT BRASS COMPANY

Executive Offices: BRIDGEPORT, CONN.—Branch Offices and Warehouses in Principal Cities

SHEETS, ROLLS, STRIPS—*Brass, bronze, copper, Duronze,** for stamping, deep drawing, forming and spinning.

CONDENSER, HEAT EXCHANGER, SUGAR TUBES—For steam surface condensers, heat exchangers; oil refineries, and process industries.

PHONO-ELECTRIC* ALLOYS—High-strength bronze trolley, messenger wire and cable.

WELDING ROD—For repairing cast iron and steel, fabricating silicon bronze tanks.

LEDRITE* ROD—For making automatic screw machine products.

"Bridgeport" BRASS CO.

Established 186

COPPER WATER TUBE AND FITTINGS—For plumbing, heating, underground piping.

DURONZE ALLOYS—High-strength silicon bronzes for corrosion-resistant connectors, marine hardware; *hot rolled sheets* for tanks, boilers, heaters, flues, ducts, flashings.

BRASS, BRONZE, DURONZ WIRE—For cap and machine screw wood screws, rivets, bolts, nuts.

FABRICATING SERVICE DEPT. Engineering staff, special equipme for making parts or complete iten

BRASS AND COPPER PIPE "Plumrite"* for plumbing, und ground and industrial services.

*Trade-name.

BRIDGEPORT BRASS

s unnecessary. Most manufac-
s employ a pore size small
gh to produce a brick of uni-
texture and relatively smooth
arance.

rmeability is a property that is
to control. It should be in-
d in specifications only when
nnot be compensated for or
mized by use of tight steel-
construction to retard air in-
tion or where reducing of per-
bility by means of a coating or
g on the inside of the furnace
g may not be practical. This
r method of reducing air infil-
on often cuts the amount of air
ring by 50 per cent. Usually
a coating consists of two ap-
tions of a refractory air-set ce-
t, each of eggshell thickness.

Strength Aids Shipment

mpressive or cold crushing
ngth is not so important in mod-
constructions except where un-
al thrusts occur. Ten pounds
square inch is probably high for
wall constructions. Arches may
required to withstand higher
ls than this, especially during
heating up period when a side
ust is exerted due to expansion
he brick. However, loads in ex-
of 50 pounds per square inch
obably are rare.

n the other hand, the compres-
strength is a good measure of
well the insulating firebrick
withstand shipment. A com-
ssive strength less than 150 to
pounds per square inch usually
ndesirable from the angle of
ment. A minimum specification
re near this value perhaps may
to assure receiving shipments
out breakage.

lodulus of rupture or transverse
ngth is of little importance ex-
t where a single span is con-
ned or where a wall tie-in is in-
ved. Also, modulus of rupture
s off with repeated heating and
ling. Usually it would be of
re value if this factor were
wn for the brick in a heated con-
on, but this figure is difficult to
ermine without special appara-
and is further complicated at
higher temperatures by the ad-
onal factor of plastic flow.

hermal conductivity is a most
portant factor and should be in-
ded in all specifications. In back-
installations, it is extremely im-
tant. In such installations as
ctric furnaces, it is desired to
e all the current possible. Many
h installations employ several
hes of diatomite powder on the
side and at least 9 inches of
kup brick with an insulating fire-
ck lining of a thickness some-
es exceeding 9 inches. For such
application, a maximum figure
2 B.t.u. at 1500 degrees Fahr.
mean temperature for the commercial conductivity of the backup material is suggested.

While in heat-treating applications the fuel saving is an important consideration, it must be balanced by other factors such as spalling resistance and general flexibility. Here it is recommended that the conductivity be kept under 3 B.t.u. at 1500 degrees Fahr. mean temperature.

On many installations, fuel saving is not the only consideration. A furnace may be desired that will withstand considerable punishment and yet be light in weight and have a high degree of flexibility. In this type of installation, brick usually is directly exposed. A conductivity between 3.5 and 4 B.t.u. at 1500 degrees Fahr. mean temperature appears at present to be necessary here.

Load-bearing ability of insulating firebrick rises with the temperature until a point is reached where plastic flow begins. Then strength tapers off and as plastic flow becomes more apparent, the brick slumps. Some insulating firebrick has been found to double its compressive strength when the temperature was raised as high as 1600 to 1800 degrees Fahr.

Panel type tests have been compared to load tests under soaking heat conditions. In the ordinary panel type test, little or no subsidence is shown. While bulging of sidewalls because of inadequate expansion joints, fusion due to too high a temperature and spalling of arches have sometimes been experienced, failure of insulating firebrick under load has been extremely rare. This is attributed to the steep thermal gradient that usually exists in an insulating firebrick wall.

In a load test where the brick is surrounded completely by soaking heat conditions, a point will be reached with rising temperature where plastic flow starts. However, such tests do not simulate actual furnace conditions except for piers, and in such cases a stronger brick than insulating firebrick should be used unless the required temperature is on the upward slope of the curve for temperature vs. load-bearing ability.

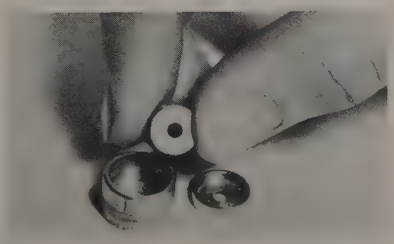
For these reasons, it appears that no hot load test is sufficiently well developed at present to be included in general specifications for insulating firebrick except, perhaps, in special cases.

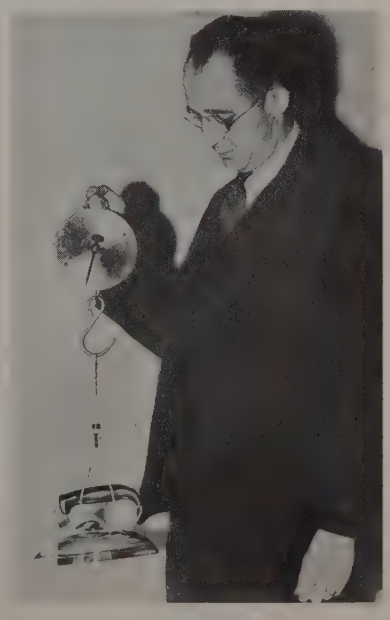
Spalling resistance is an extremely important property. However there is at present no standard test for its determination although several tentative procedures have been published. Perhaps the panel type test may offer the best solution. If the A.S.T.M. method for dense refractory brick is used, it should be modified to include a less rapid cooling rate. The entire problem of panel spalling tests in connection with insulating firebrick is complicated by the extremely high rate of heat loss as compared to firebrick.

Freedom from shrinkage in service at any specified temperature is important, and some limit should be placed on the brick. Measurement of this property is somewhat contro-

Lifts 1500 Times Own Weight

■ **A 1.85-gram magnet that will lift a 5-pound flatiron has been developed by General Electric Co., Schenectady, N. Y. The tiny magnet is made of Alnico, alloy of aluminum, nickel, cobalt and iron, specially heat-treated to develop its magnetic properties. Magnetism is brought to a maximum by use of a steel sheath around the alloy pellet. This shell concentrates magnetic lines of force as a magnifying lens concentrates a diffused stream of light**





versial because of tests already existent in the A.S.T.M. manual and because panel type tests recently have been proposed. These latter ultimately may serve as the basis for an entirely new type of test on shrinkage.

Effect of time on shrinkage of insulating firebrick is decidedly important. Therefore, short-period tests should not be used as this would show some brick to an advantage that might not actually exist in service.

Since atmospheric control is common in connection with insulating firebrick installations, it may be desirable at some future date to design shrinkage tests for insulating firebrick under special atmospheric conditions. Certain atmospheres induce more shrinkage than normal oxidizing conditions.

A.S.T.M. test C93-34T for shrinkage is fairly severe. Experience shows that soaking conditions produce more apparent shrinkage than when brick is tested in a panel type test. Therefore, when the soaking test is used, allowable linear shrinkage at any given temperature may be 2 to 2½ per cent. For the panel type test, it should perhaps be as low as ½-per cent, but more experience is needed before a definite recommendation can be made.

While it is extremely difficult to discuss so many properties in such a short space, it is hoped the above will serve as a guide in preparation of better specifications for insulating firebrick.

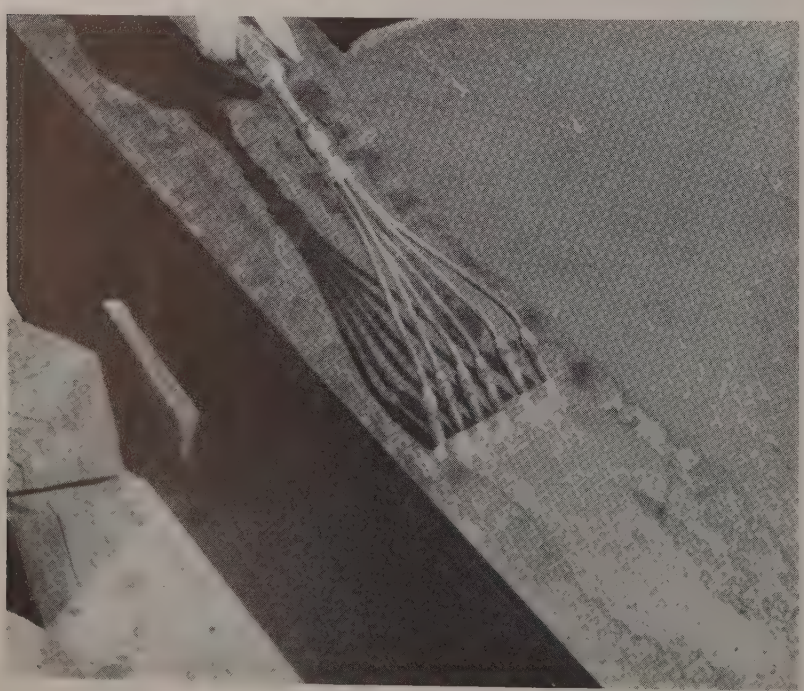
Descaling Made Fast Work With Multiple-Flame Torch

■ RECENTLY a manufacturer of road machinery was having considerable difficulty in the removal of scale from channels used in his equipment. Principal complaint appeared to be that paint peeled off with the scale after the road graders had been in operation for several months.

Several methods of scale removal had been tried with little success. A wire brush, hammer and chisel, hand brush, etc., had all been employed with equally unsatisfactory results as only part of the scale could be removed by these older methods.

Seeking a better method, a new type of multiflame torch was tried. Developed by Air Reduction Sales Co., New York, this torch employs six 5-flame tips operating simultaneously to descale an area 6 to 8 inches wide in one pass, as seen in the accompanying illustration. All

Here a special oxyacetylene torch with six 5-flame heads is rapidly cleaning the surface of structural steel members. Photo courtesy Air Reduction Sales Co., New York



was found to be removed effe ly from the metal. Operation o torch was so satisfactory that cials of the company inquired were possible to clean up a qua of ½-inch plate which had acc lated much rust and corrosion. also was done successfully.

Since it is frequently necessa remove old paint from machin this plant, formerly done by s ing off with a tool and wire b the descaling tip was employed this work too. It is possible t move more paint with it in 30 utes than two men could remo a day using the older method.

The torch is used from 3 hours each day in this plant for work now. Some idea of costs scale removal can be obtained f the following data: Descaling a 15.5 square feet of surface o channel, 7 x 2½ inches x 15 fe inches (only one side descaled side web and flanges) took 10 utes and required 10 cubic fee acetylene and 15 cubic feet of ox per piece. Three passes were n in cleaning a 7-inch channel. O pieces of channel, the area per ute descaled was 1.55 square using 0.645 cubic feet of acety and 0.97 cubic feet of oxygen square foot descaled. This was a torch having six tips, each five flames, holes of No. 70 drill and using 12 pounds oxygen sure, 10 pounds acetylene pres

Plating Improved By Electric Heaters

■ Making ambulance cots, stre ers and similar chromium pl items the Bomgardner Mfg. Lakewood, O., does a large am of chromium plating in its plan

To maintain uniform temperat in the plating bath, two 3000-v electric immersion heater units acid-resisting sheathing rece were installed. With a ther couple in the bath and connecte a control device, the plating s tion is maintained at 110 deg which provides uniform plating ditions.

Over nights and week-ends temperature is maintained at 50 grees, which makes it possible raise the temperature to 110 grees in about 1 hour. The g given off by the bath contain a tain amount of chromic acid sp A steel hood was installed surro ing the plating tank with ducts ing a slot about 1 inch wide dire above the surface of the bath permit effective removal of g and spray. This provided much ter working conditions according an entry in the industrial hea contest recently sponsored by eral Electric Co., Schenectady, N

for GOOD CUTTERS — NEW CATALOG 33

should be your buying guide for 1939 . . . . copy on request.

B·S BROWN & SHARPE MFG. CO.
PROVIDENCE, R. I., U. S. A.

ROWN & SHARPE CUTTERS

Enamelware

New continuous U-type furnace and relocation of departments and equipment greatly increases efficiency of enameling plant handling large volume of kitchen utensils. Production is raised to a capacity of 100,000 pieces of quality wear daily

■ ANOTHER step in the plant expansion program of Moore Enameling & Mfg. Co., West Lafayette, O., is marked by a series of changes completed late in 1938.

General offices were moved to new quarters, separate from the factory buildings, and the mill room office was moved closer to storage and dip tanks. Of most interest is the new continuous U-type furnace installed for production of gray ware. The changes, devised by Mr. W. B. Moore, president, and R. S. Cobb, factory manager and engineer, make possible better handling of materials in process and have increased the available space for added production.

Since its organization in 1924 the Moore Enamel & Mfg. Co. has increased its capacity and equipment a number of times, adding a new building in 1932 and another in 1936. With increased gray ware production and addition of new lines, present output consists of a full line of gray ware, color ware and white ware.

Moving the mill room equipment close to the dip tanks has proved a most valuable change as it has greatly minimized enamel handling. Moving one mill at a time permitted the relocation of the mill room without loss of production. In addition to being moved, each mill was changed from lineshaft belt drive to direct motor drive thus making a more flexible arrangement. A mezzanine floor over the new mills facilitates loading. Storage area for enamel frit and raw materials also is on the mezzanine floor.

Enamel storage tanks are located immediately adjacent to the r mill room. The gray enamel t is of particular interest. It ha large capacity and is equipped w power driven agitators.

The new Ferro continuous U-t furnace recently installed produ ware at a chain speed of 11 feet minute. Furnace temperature 1650 degrees Fahr. An average 34 gallons of fuel oil is used hour. The support tooling consi of alloy frame baskets spaced or foot centers and hung from al supports which are 16 inches centers. Each basket can be loa with 15 to 20 pieces depending up the size and shape of the holl ware. Furnace conveyor chain erates on a 4-inch I-beam track a is driven by a floating caterpil drive unit.

Safety Motor Shutoff

Caterpillar drive is free to m against spring tension, the sprir just balancing the pull required move the chain. A limit swi connected to the drive motor combined with this "floating" f ture. Should the conveyor beco jammed, the caterpillar dri moves forward against the sprin to contact the limit switch whi shuts off power to the driving m tor before serious damage occurs conveyors or furnace.

Burning zone through which t conveyor chain travels is 30 f long. Total length of conveyor 325 feet with 185 feet outside t furnace. Ample loading and u loading space is provided. Built the shape of an L, the furnace in plain view. It is 80 feet long a averages 13 feet in width. T long part of the L contains t burning zone and part of the p

Entrance view of Ferro, continuous, type enameling furnace. Photos courte "The Enamelist" Cleveland

Exide-Ironclads . . .
for more and better material handling at lowest possible cost

BY speeding up your electric industrial truck, you'll get a greater return from your truck investment. Let Exide analyze the job. Or . . . if you measure your truck's battery compartment, we can tell you in a few minutes how large an Exide-Ironclad can be installed and how much more work that truck will be capable of doing.

In addition to the MVM and TLM Exide-Ironclads, Exide has the oversize Types MEH and FLM. They are so assembled that they give you the maximum capacity and power for the battery compartment of every make and type of truck.

Because of the way steel trays save space, it is often possible with these new Exides to install, not only an oversize battery, but in many cases two and three extra cells. Thus the truck is enabled to do more work, and to do it at higher speeds. If faster speed or more work from your trucks is needed or helpful, you can get it with one of the new Exides.

For use on all makes of trucks, there is the new Exide Discharge Indicator, which helps to eliminate "afternoon" fatigue and to keep trucks moving at excellent speed throughout the day's operation. For the charging panel, there is the Exide Charge Control Unit that makes the recharging of batteries simply a matter of turning a knob. Write for full details on these important developments, and get the facts on how to get more and better material handling.

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto

Exide
IRONCLAD
BATTERIES
With Exide **MIPOR** Separators
"MIPOR," Reg. U. S. Pat. Off.

Traveling at a rate of 11 feet per minute, it is easily apparent how 100,000 pieces can be turned out daily if the chain is kept loaded like this

heat and cooling zones. This section is built of firebrick with a steel plate shell. Flues are built in the floor and run from the combustion chambers to the stack. Short leg of the L is constructed of rock-wool insulated, steel panels. An air seal arrangement is located at the open end of the insulated panel section. Here thin sheets of air move across the opening both down from the top and up from the bottom to prevent excessive heat loss and to eliminate longitudinal air current induced by the moving conveyor.

Two 4-inch oil burners fire at the rear of the furnace into two of the three V-bottom combustion tunnels. V-bottom and muffle tile are of silicon carbide material to obtain fast heat transfer and low fuel consumption. Under normal load, fuel consumption averages 34 gallons hour. Burners are capable of d ering 50 gallons per hour if quired, so reserve is available.

Recording controller records temperature in the burning z and controls an automatic oil proportioning valve according the required temperature sett This arrangement provides con uous automatic control and ma a permanent record of temperat

Bunker C oil is used. It bu satisfactorily when heated to proximately 200 degrees Fahr. 2 pass, 56 tube recuperator, stalled parallel with the stack nection, extracts waste heat f hot furnace exhaust gases makes it possible to pass the ga through or around the recupera at will. Designed to deliver 5 cubic feet per minute of air hea to 400 degrees Fahr., the recup tor supplies a large part of the h requirements of the drier equipm necessary for increased produc handled by the furnace.

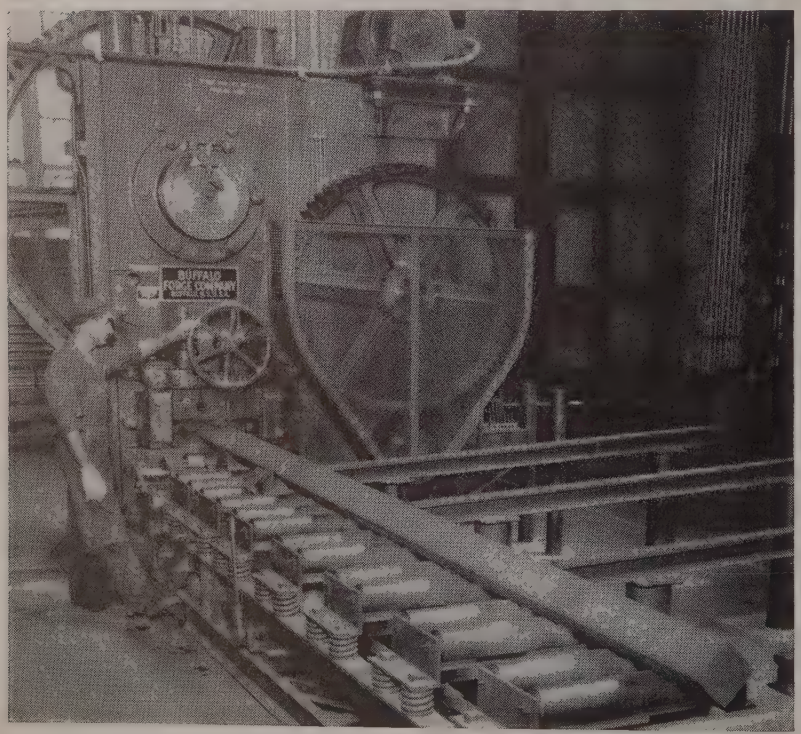
Recuperator consists of a b shell, 4 x 5 x 17 feet high, with silicon carbide tubes placed h zontally. Openings at top and tom provide inlet, outlet and by-p for the furnace gases going to stack. Channel and steel plate struction form headers for tubes.

In operation room, air pu through the upper half of the tu to the steel header is reversed pass through the bottom half the tubes into a duct which car the heated air to the drier fan. furnace gases enter the bottom the recuperator and pass upw around the tubes heating the air inside the tubes. At the to breeching takes furnace gases the stack.

This rearrangement of the pl and addition of new equipm places this company in a posit to turn out 100,000 finished pie of quality ware a day and make one of the leaders in the kitc cooking utensil field.

♦

Square Bars Handled in Diagonal Position



■ This bar shear conveyor table has been arranged to handle rounds and squares in lengths up to 17 feet and weights to 2000 pounds. A mobile surface is provided by a heavy duty ball bearing rollers, mounted on springs to absorb shock. Table elevation is adjustable by means of screw jacks. Bar stock is fed into the shear by a power-driven, grooved wheel and a guide roller. Photograph courtesy Mathews Conveyer Co., Ellwood City, Pa.

Increases Field for Wrinkle Applications

■ Recent tests by New Wrin Inc., Dayton, O., indicate wrin finishes deserve more recognition the field of low temperature dryi Such items as safes with large s face areas and good furniture a not subjected to intense oven h for obvious reasons. However wrinkle finish dried under a hot blast at 150 degrees Fahr. on cha and office furniture shows excell resistance to scuffing due to its treme toughness and durability

Welded Barge

Details of design and construction of an outstanding all-welded steel fabrication are presented here. Unit, largely shop welded, has large proportion of welds made in downhand position. Use of wide plates reduces number of joints

By J. T. DALCHER
Consulting Engineer
New York

O PRODUCE an economical ctural design, the following fea- s should be embodied: Suitabil- for the work it is designed to orm, sound structural design, omy in its welding technique, active first cost and economy in ation. The welded barge de- ed here was developed with the ation of fulfilling these condi- s.

e design calls for an all-welded l barge, of 1000 tons capacity of sufficiently rugged construc- to withstand the rough han- g to which such barges are sub- ed. The design has been re- ed to the simplest form. Wide es, now readily available, are l wherever possible to reduce number of joints.

esigned to meet the rules and ulations of the American Bureau shipping, barge has 150-foot gth, 40-foot beam with a width r fender of 40 feet, depth amid- of 10½ feet and depth at sides 0 feet 3 inches. Water tight bulk- ds subdivide the barge into 11 partments, enabling it to stay at with one or more compart- nts flooded.

While a bare deck barge, its con- uction lends itself readily to car- g cargo below decks by the ad- on of a cargo hatch in the deck floor of center compartments. k house, railings, deck bulk- ds, etc., are usually supplied to et each individual owners own s. Barge also can carry liquid go below decks, or dry cargo on and liquid below.

ccompanying drawings show eral outline and important de- l features of the barge. Fig. 1 ws arrangement of deck barge; Fig. 2, transverse sections. Note all parts are fabricated and erected without using erection bolts. This eliminates drilling holes. Suitable dogs and wedges provide for temporary securing of plates and shapes.

Deck fittings such as bitts, chocks, etc., are fabricated from pipes, plates, bars and shapes and welded. In case a number of identical fittings are required, jigs are prepared to make all parts interchangeable, further reducing unit cost.

Welding as here applied is comparatively simple, with overhead welding reduced to a minimum. Members to be joined are all of uniform thickness, and the design as a whole is a simple welded structure that can be manufactured in any small shipyard using standard arc-welding equipment.

All plating, bars and flats are received from the steel mill with edges sheared to size, allowing for the usual mill tolerance as applied to this class of material. All shapes are standard rolled sections.

All steel plating, bottom, sides and deck are assembled in sections by lining up two adjacent plates on suitable blocks in a horizontal position, leaving a uniform gap depending on plate thickness. In case the plates are sheared at the mill with plus tolerances, the sections so spaced will become wider than called for on the plan. In case the tolerance is minus, the sections will be narrower.

Angle stiffener or backing-up member now is positioned over the

This is an abstract from the paper which received the second main award, $2,543.88, in the Watercraft classification of the $200,000 Award Program sponsored by the James F. Lincoln Arc Welding Foundation, Cleveland.

Coaling Station Made Of Welded Alloy Steel

■ **Said to be the first all-welded, alloy steel coaling station in service, this unit was built at Easton, Pa., for Lehigh Valley railroad by L. G. Plant, Washington. Station has coal capacity of 125 tons, and additional space is provided for storage of dry sand in a semicircular bin seen on the side of the structure. Mayari R low-alloy, high-strength steel was used in this construction because of its resistance to atmospheric corrosion. Photograph courtesy Bethlehem Steel Co.**

WHY RESIST

the trend to WORTH?

With Worth Sheared Steel Plate quality is UP; physical and metallurgical characteristics always are UNVARYING . . . and Worth service is personal, prompt, entirely dependable.

Any Worth customer will verify this . . . or, see for yourself; send your next order to Worth!

WORTH

New York, N. Y.
Wm. C. Dickey

Pittsburgh, Pa.
McKee-Oliver, Inc.

St. Louis, Mo.
Hubbell & Sharp

Boston, Mass.
H. J. Linn Co.

San Francisco, Calif.
W. S. Hanford

Houston, Texas
The Corbett-Wallace Corp.

Seattle, Wash.
National Steel Sales, Inc.

Los Angeles, Calif.
Ducommun Metals & Supply Co.

Cleveland, Ohio
E. F. Bond

Detroit, Mich.
H. L. Sevin

Portland, Oregon
National Steel Sales, Inc.

Montreal and Toronto, Canada
Drummond, McCall & Co., Ltd.

WORTH STEEL COMPANY
CLAYMONT, DELAWARE

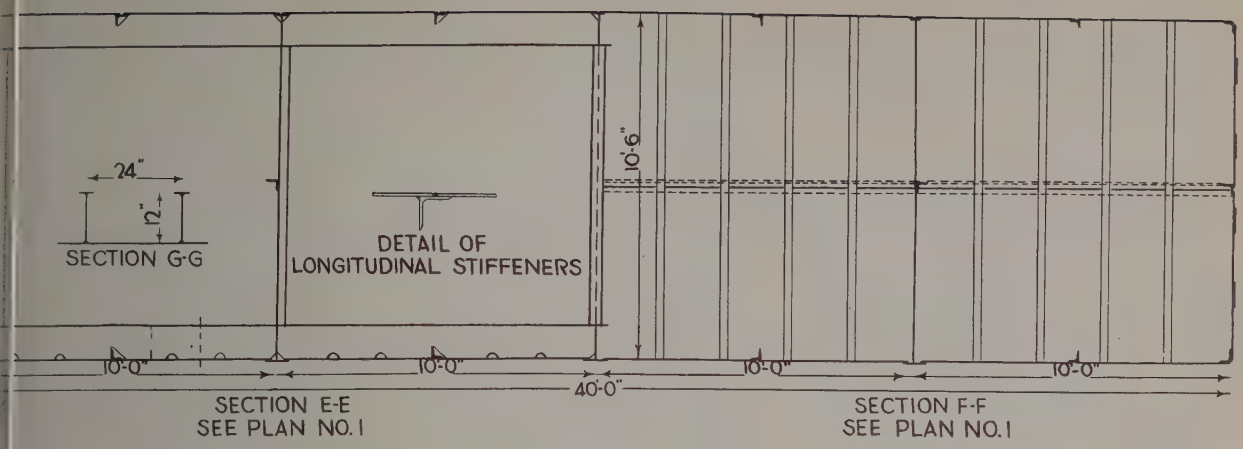


Fig. 2—Details of transverse sections from general sketch, Fig. 1

e between the adjacent plates tack welded in position, using a h weld spaced about 24 inches t and alternating between heel toe.

ne two plates with the angle bar form one section and are ed over 180 degrees on the ks, leaving the gap between the plates on the upper side free down-welding of the longitudinal er tight seam. With this com-ely welded, the section is again ed over 180 degrees. Trans-se frames are now located in tion and tack welded at each end he section to prevent dislocation, r which the frames are inter-tent welded, using a 2-inch weld 4-inch space, alternating from side of the frame to the other. s will be seen from the plans, construction of sides and deck ions is in all respects similar hat of the bottom sections and

1—General arrangement of deck ge showing sections at several points

the same welding procedure will apply.

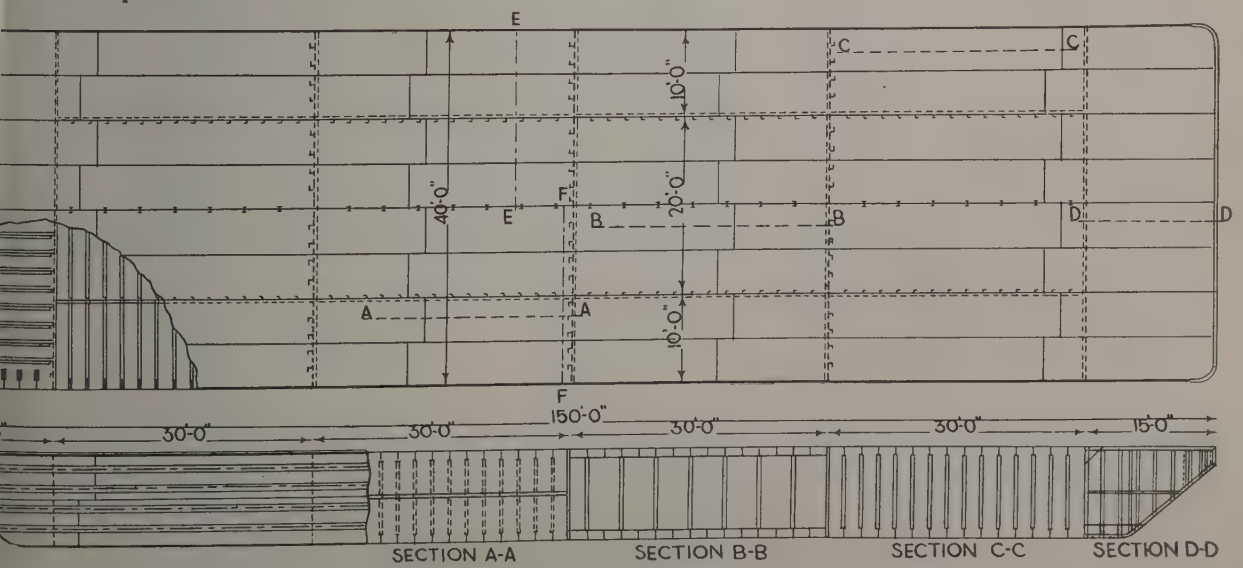
The frames consist of hot rolled flats with a strip welded on top to form a T-section. The fillet weld securing strip to flats is intermittent, 2-inch weld with 4-inch space, placed alternately on each side to prevent warping. The frames are notched by gas cutting to clear longitudinal stiffeners. Corners at the ends are cut diagonally to clear corner angles on one side and bulkhead or intercostal girder at the other. Notches and diagonal cuts at the ends also serve as drains for the bottom frames.

Bulkheads are built of flat plates with horizontal joints backed by an angle bar, similar to the joint described for shell plating. The bulkhead stiffeners, arranged vertically and spaced as shown on plan, consist of angle bars, arranged toe to plating. This position of angle bars affords greater strength as each angle represents a Z-section in conjunction with bulkhead plating.

After being located on the bulkhead sections and while in a horizontal position the angle bars are tack welded at each end to prevent dislocation, after which they are finally secured by intermittent welds, 2-inch weld and 4-inch space, arranged alternately on each side of angle flange. This construction applies to transverse as well as longitudinal bulkheads.

Transverse bulkheads are made up in three sections each. Wing sections are welded to bottom, side, deck and longitudinal bulkhead; the center sections to bottom, deck and longitudinal bulkheads. After being located they are first tack welded in position using 1-inch welds spaced about 3 feet apart. Now they are ready for final welds, either intermittent 2-inch weld and 4-inch space, or continuous welds for water tight bulkheads.

Longitudinal bulkheads preferably are made up in one section to cover the distance between transverse



bulkheads. The lower edges rest on keel plates, the top edges have a flat bar welded as shown on plan, using intermittent fillet welds in case of non-water-tight bulkheads and full welds in case of water-tight construction. These top bars act as a landing place when deck sections are put in position and as a backing-up member for the longitudinal joints in deck plating.

Intercostal girders located amidship form a continuous member between end transverse bulkheads and consist of flats, the lower one being secured to centerline bilge plate, the upper one carrying a bar on top.

Both girders are welded to bilge plate and top bar, using 2-inch welds and 4-inch spacing, alternating from one side to the other. The bar of top girder acts as a landing place for deck sections and as a backing-up member for the longitudinal joint in the deck plating. Ends of transverse frames, deck and bottom are intermittently welded to girders, 2-inch weld, 4-inch space.

Keel plates are welded to one section of bottom, being first tack welded from the inside with a 1-inch weld spaced about 36 inches apart. Then after section is turned over, a full fillet weld is applied to secure outer edge to bottom plating. Bottom corner angle is similarly welded to end of side bottom section.

Angle bar frames of end section first are assembled with corner, end and bottom brackets secured by intermittent welds. In addition each frame has one vertical and one horizontal angle bar member, secured by intermittent or continuous welds to angle bar frame and bottom brackets respectively.

Frames Positioned

The assembled frames of end sections, spaced as shown on plan, Fig. 3, are first positioned to bottom plating, end transverse bulkhead, deck plating and headlog plate by tack welds with a 1-inch weld spaced about 36 inches. Afterwards the connections are completed by intermittent welds, 2-inch weld and 4-inch space. All angle bar frames are arranged toe to plate for greater strength.

Side frames of end sections, located and spaced as shown on plan, consist of flats with a strip welded on top to form a T-section, similar to main body frames. These side frames are positioned to sides of end sections by 1-inch tack welds spaced about 36 inches apart and afterward intermittently welded to side plating, 2-inch weld and 4-inch space. Single flats, located inway of rounded corners at ends are secured by intermittent welds similar to the other side frames.

Shop welding now being completed, the various sections of the barge are transported to the launching ways and erected. As each section is located, welding operations proceed in the following sequence:

With end section of bottom placed in position, the side section is erected and temporarily shored. In this position, bottom corner angle is first tackwelded on the inside to side plate. Afterwards the bottom end of side plate is welded to angle on the outside by a continuous fillet weld. In addition, flat of side frame is welded to bar of bottom frame by 2-inch intermittent welds spaced 4 inches apart. This makes each frame a continuous rectangular member consisting of bottom, two sides and deck frame.

Welded to Keel

Other end of bottom section, with one end of keel plate already welded, receives the longitudinal bulkhead section which is welded to keel plate by a continuous fillet weld. End section of frame also is welded to bulkhead by intermittent welds.

Inside bottom section next is put in position, the end plate tackwelded to keel plate from the inside and afterwards the edge of keel plate is welded to bottom plate on the outside, using a full continuous fillet weld. The frames of this bottom section are intermittently welded to longitudinal bulkhead on one end and to the intercostal girder at the other.

After deck section has been hoisted in position and landed on top corner angle of side section and bar of longitudinal bulkhead, the deck plating is tack welded to toe of top corner angle from the inside. Afterwards the edge of deck plate is fully welded to top corner angle by a continuous fillet weld on the outside. The other end of this deck section is first tackwelded to edge of bar of longitudinal bulkhead from the inside. The outside full continuous weld is applied after the next adjacent deck section has been tackwelded to the other side of bar of longitudinal bulkhead. Ends of frames of end deck section are intermittently welded to side plating and longitudinal bulkhead respectively. All other sections of the barge are progressively welded together in the manner described above.

The "H" columns, located as shown on plan in way of intercostal girders, are welded to bars of frames top and bottom by a continuous weld, 5 inches long, on both sides of column.

Transverse joints of shell plating, located as shown on plan, are fitted with a backing strip, 3 inches wide, ¼-inch thick. These strips are tackwelded to inside of bottoms, sides and deck plating, using a 2-inch weld spaced above 18 inches. The gap between plate edges is the same width as that of the corresponding shell plating. The strength weld, applied from the outside, consists of fillet welds and one covering we

After each fillet weld has b completed and before covering w is applied, it will be necessary peen thoroughly each weld to duce shrinkage stresses to a m mum. It may also be desirable heat the plates about 2 feet b of transverse joints to distrib localized stresses in plate we after welding is completed. For same reason transverse joints plates should be left to cool th oughly before another seam welded in the vicinity.

Corner angles at headlogs, b top and bottom, after being fit in position are secured by the u al tack welds, after which the t flanges are welded by a continu fillet weld. The two short k plates at the bottom of each ba end after being fitted and tack we ed are welded to bottom plates a continuous fillet weld on b sides.

Fender plates next are located each side of barge by 1-inch t welds about 4 feet apart. Then and bottom edges are welded barge sides by a continuous fi weld. Joints in fender plates made like joints of longitudinal sh plates.

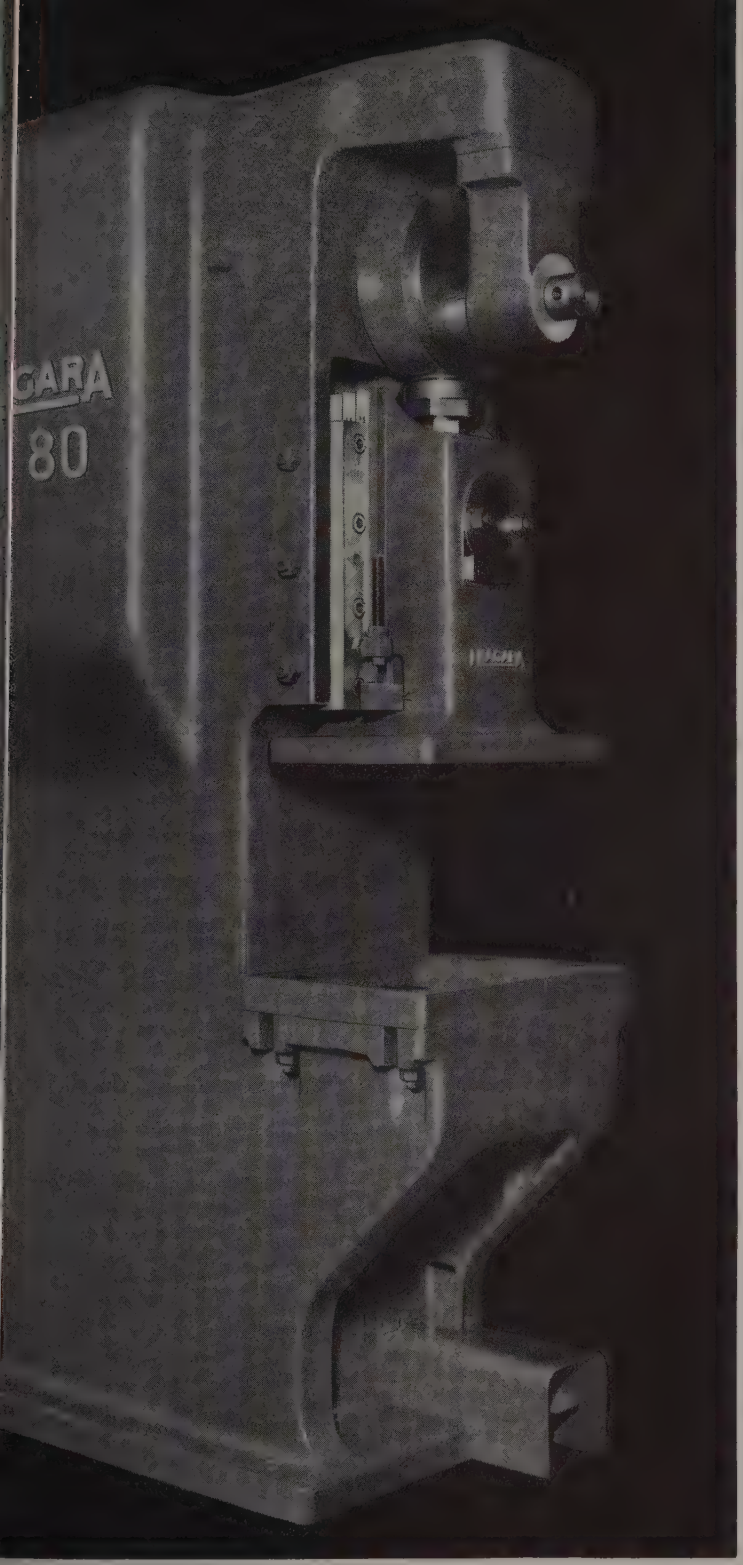
All dock fittings are welded the dock by continuous fillet wel All watertight seams are tested filling the compartments with wa or by the application of a wa stream with a nozzle pressure of less than 60 pounds per square in Any welds showing leaks or loc ized cracks are removed by chippi and the section rewelded.

After barge has been tested a approved, all interior and exter surfaces are wire brushed thorou ly and given one coat of red le A second coat is applied in the terior and one or more color co to the exterior.

Compound Protects Met Parts Against Rusting

■ Developed for rust protection metal parts and manufactured st articles, a waterproof, tenacio paste-like compound has been a nounced by D. C. Cooper Co., East Eighteenth street, Chicago.

In applying this rust preventati the pasty compound is heated to liquid state and article to be p tected is completely immersed. the compound may be cut back wi gasoline, kerosene, naphtha or a other petroleum solvent to a bru ing or spraying consistency. Se ice to which article is to be put termines consistency. It is said t rust preventative will not beco rancid or oxidize after solvent h evaporated.



Series "U" Streamline Punch Press with integral bed. Series "UA" also without bed; or with bed bolted in one of several fixed positions; or hanism for vertical adjustment of bed. Built in a complete range of sizes.

New NIAGARA Streamlined PUNCH PRESSES

The many new and exclusive improvements built into Niagara Series "U" and "UA" Streamlined Punch Presses are of more far reaching importance than simply improved appearance.

Steel Casting Frame not only provides strength and rigidity to maintain alignment of all working parts, but provides a completely enclosed housing for shafts, gearing, fly-wheel and motor. Clutch, all gears, and anti-friction bearings operate in oil. All gears are supported between bearings.

Patented Niagara 14 point Sleeve Clutch with built-in single stroke mechanism provides instant engagement, more strokes per hour and utmost safety.

Slide operates in adjustable, multiple "V" gibs.

Compact streamline design makes it possible to locate presses close together in production lines.

WRITE FOR BULLETIN 60-C

NIAGARA

NIAGARA MACHINE AND TOOL WORKS, BUFFALO, N. Y.

ranches: Leader Building, Cleveland; General Motors Building, Detroit; 50 Church Street, New York

Controlled Work Hardenin

Increased hardness and resistance to wear are incorporated into railroad track equipment by a method which depends on the ability of austenitic manganese steel to harden under impact. Process has wide range of application

By R. A. PROSSER
Ass't. Metallurgist
American Manganese Steel Div.,
The American Brake Shoe &
Foundry Co.
Chicago Heights, Ill.

■ MODERN railroad traffic with its higher speeds and heavier loads has necessitated improvements in railroad tracks, a typical example of which is the depth-hardened crossing recently introduced by American Manganese Steel division of The American Brake Shoe & Foundry Co., Chicago Heights, Ill.

Original crossings made of 10 to 14 per cent manganese steel, having an austenitic metal structure, enabled these members to resist high impact and abrasion. However, when higher speeds and heavier traffic became common, foundry engineers faced a difficult problem, for a heavier crossing based on old designs tended to flow and pound down excessively on the receiving surfaces.

One expedient adopted was to cast pads on the corners of a crossing. These then were hammered down to surface level before installation. This cold working of metal prior to installation tended to forestall flowing in service. However, observation of crossings and tracks in service sometimes indicated unsound metal under the surface.

X-ray examinations showed that even a light reinforcement in the box-like section under the points and flangeways had a tendency to produce shrinkage cavities; and yet ribs or other supporting members were necessary to prevent fatigue cracks from repeated flexing of the casti under passing trains. It appea that proper strength could only attained at the expense of pro wear or resistance to flexing.

Finally the problem was sol by eliminating ribs entirely fr the casting, leaving it in the fo of inverted channels, thus allow equalized metal sections through the piece. Radiographs indica that a principal cause of unso metal had been eliminated.

It then was feasible to weld i special supporting member un neath the unit as shown in acc panying illustrations. This prote the casting while undergoing ha mering during the work-harden procedure. The reinforcement a forms a permanent flangeway s port. The new Amsco depth-ha ened crossing is made as follo Starting with a sound casting h ing tapered pads cast on the rec ing surfaces as shown in Fig. 2, first step is heat treating. This done carefully to retain the aust itic metal structure of the 13 cent manganese steel.

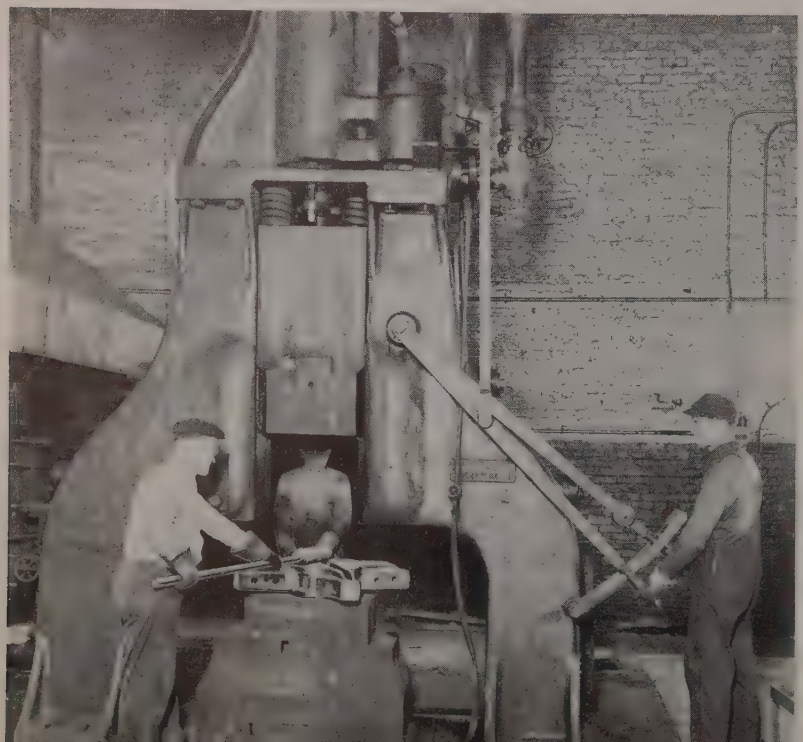
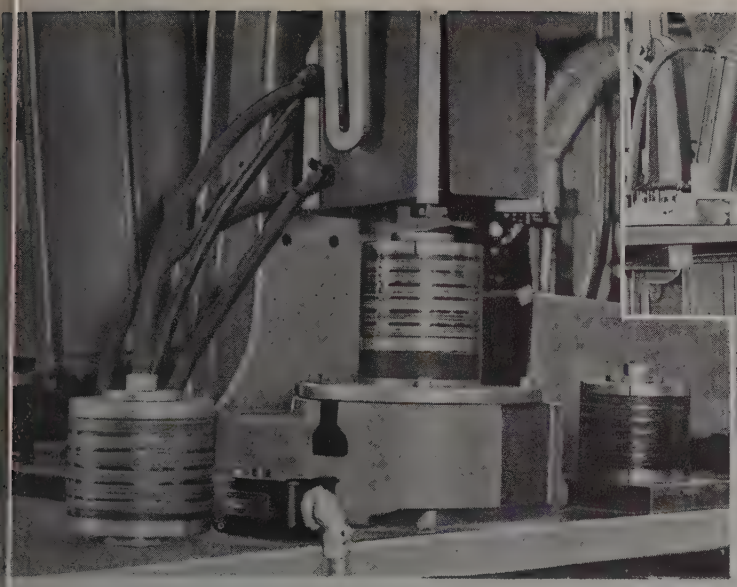


Fig. 1—During the work-hardening pro ess, a round tool is used as shown he

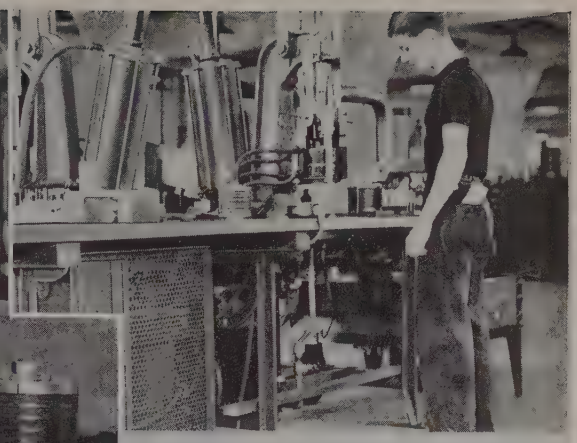
Depth Hardening Reduces Flow

After a preliminary rough gri ing operation and the welding-in the supporting grid, the crossing depth hardened. This process w developed by the American Man nese Steel division of The Americ Brake Shoe and Foundry Co. to eli inate the excessive flow under t traffic which takes place in unha mered manganese steel crossin Depth hardening consists of c working the points of crossings a degree approximately equal to t maximum flow encountered in actu service.

The extent of deformation of large number of ordinary mang



tors for Victor Record Players, made up of laminations covered glue and assembled on one spindle, are heated and pressed in three minutes and forty seconds.



The entire assembly and heating operation is performed on one bench, with the Ajax-Northrup Converter and Controls located underneath.

Stepping Up Production of the

Formerly only 600 — now 6000 laminated rotors per day! That is the story of high frequency induction heating with Ajax-Northrup Heating Coils applied to the production of the RCA Victor Record Player.

Results: 12 rivets eliminated; diameter reduced one inch; area reduced 30%; 12 laminations replace 16; 48% of weight saved; assemblies more accurate; saved hobbing and broaching teeth; reduced cost of motor more than half and increased production 1000% per 24 hour day.

WHAT CAN HIGH FREQUENCY HEATING DO IN YOUR PLANT?

Somewhere there is a production operation involving heat applied to or near metallic parts. You may need heat for forging, brazing or upsetting, or only heat enough to glue or soften the materials during the operation. If you have such a situation, you can expect a revolutionary improvement —in the quality, quantity, control, space required and cost per job.

High frequency heating is so new that we cannot anticipate its possibilities. If you will tell us what your heating problems are, our engineers will tell you what you can save.

ASK FOR THE BULLETINS ON MELTING ☐ HEATING ☐ LABORATORY ☐

SSOCIATE OMPANIES

e Ajax Metal Co.
n-ferrous Ingot Metal for foundry use.

jax Electric Furnace Corporation
x-Wyatt Induction Furnaces for melting.

jax Electric Co., Inc.
x-Hultgren Salt Bath nace and Resistance e Electric Furnaces for heat treating operations.

AJAX

ELECTROTHERMIC CORPORATION

•

AJAX PARK
TRENTON, N. J.

AJ-8

nese steel crossings was carefully measured. Additional material comparable to this amount of flow is added to the crossing point in the form of pads, cast integral with the casting. These pads, Fig. 2, follow the flangeways for about 6 inches back from the crossing points and are approximately ⅜-inch high at the point, tapering off to the casting surface in 6 inches.

Depth hardening is completed in three steps: First operation is to grind away 1/16-inch from the surface of the hammering pad and from the vertical sidewalls of the flangeways immediately adjacent to the pads. This is to insure the removal of all decarburized metal.

Second, the actual cold work hardening is accomplished by causing the excess pad metal to flow toward the flangeways and to the point. This is done by using a special steel tool, 3⅜ inches in diameter and approximately 8½ inches long, mounted on the end of a handle and manipulated by an operator as shown in Fig. 1. A steam hammer is used capable of delivering a blow of approximately 4000 foot pounds.

The casting is set on the anvil of the steam hammer with the casting adequately supported. The tool is placed at an angle of approximately 30 degrees to gage line of the point at the thin edge of the pad. With each succeeding blow, the tool is worked progressively toward the gage line, rolling the excess metal ahead of it.

Next, the tool is placed at the opposite side of the pad, making approximately the same angle with the second gage line. Then it is worked progressively toward the gage line. After this, the tool is placed at the back edge of the pad in such a manner that it makes approximately the same angle with each gage line. Then it is worked progressively toward the point. The intensity of the hammer blow is proportionally decreased from 4000 foot pounds as the length of the line

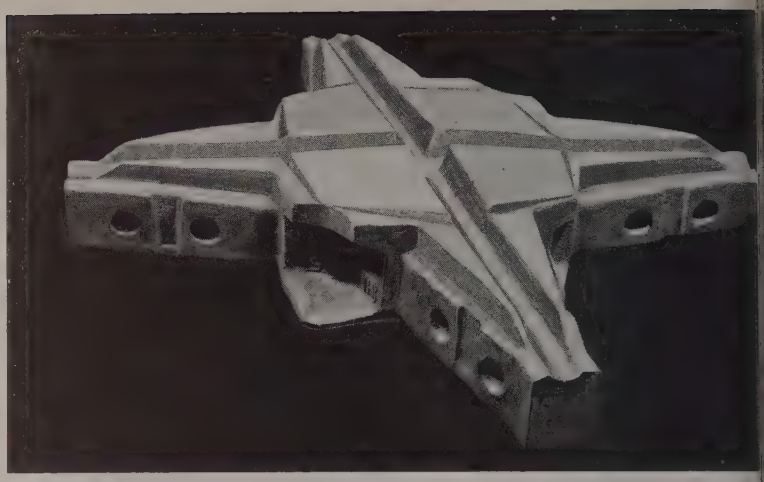


Fig. 2—This shows extra metal cast on top of surfaces. This metal will be worked down level with normal top surface during the work-hardening process

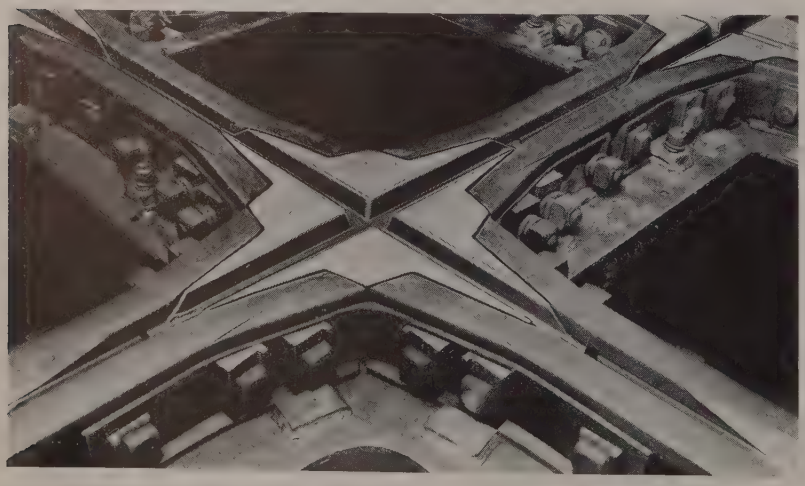
of contact of the tool decreases. This prevents damaging the point of the crossing. Hammering is continued until the raised pads have been made flush with the normal running surface of the casting.

After the hammering operation is complete, the casting will show a bulge or flow into the flangeways approximately 3/16-inch wide by ¾-inch deep. Also, it runs along with the flangeways approximately the same length as the pads. The surface hardness taken along a line parallel to and 1 inch from the gage line ranges between 325 and 400 points brinell.

The third and last step consists in removing the excess metal caused by hammering. This is followed by pressing the casting free from any bowing or warping that may have resulted during the process. Co tion of the crossing unit inv final grinding, shop assembly f and inspection. See Fig. 3 for pleted unit.

Advantages of the depth ha ing process are that it mini maintenance of crossings t selves while in tracks, and le shock to rolling equipment wit sulting savings in repairs. T new depth hardened crossings shown remarkable results in se At the intersection of the In Harbor Belt railroad with the cago & Western Indiana railro Dolton, Ill., they carry abou trains per day and after 8 m of service show wear of only 1/ ⅛-inch. At the intersection of cago & Northwestern railway's line with Chicago & Northwes railway's freight line at Des Pla Ill., the traffic amounts to abo trains per day. After 9 mo service here, the wear ranged 1/64 to ⅛-inch. At the intersecti Alton & Southern railroad with Nickel Plate road at Madison C ty, Ill., 42 trains per day pass, crossings here show only 1/3 5/32-inch wear after 16 months

Fig. 3—Complete crossing assembly after heat treatment, work hardening, finish grinding and assembly into track



Reaffirms Metal Lath Simplified Practice Lis

■ The division of simplified p tice of the national bureau of st ards, Washington, has annou that simplified practice recomm ation R3-36, metal lath, has bee affirmed without change by standing committee of the indus

This simplification program the weights of stock types, of flat rib, ⅜-inch rib, ¾-inch rib panded metal lath, and of s lath. When it first went into e in 1924, the recommendation effe a variety reduction of 101 item ducing the items listed as stock the manufacturers from 125 to It was revised in 1928, reaffirme 1935, and revised again in 1936.

ek Methods To Increase Sales
Gas Fuel in Industrial Field

(*Concluded from Page* 33)

is high over a longer period of

om the safety angle, the boilers heaters are equipped with high-le safety devices, Mr. Sellers rted. Furthermore, the CO con- in the flue products is carried point below the A. G. A. require-t, thus eliminating danger from angle. Advantages of immersion s, the speaker stated, are com-ness, ease of installation at t where steam and hot water required, and maintaining of orm temperature.

Gas Fired Boilers

dvantages of Dowtherm boilers l by gas were enumerated by ., Campbell and E. E. Magnuson, pse Fuel Engineering Co., Rock-l, Ill. Boilers operating on this nciple are particularly suitable processes requiring rapid heat nsfer, uniformity of heating, dom from fire hazards, close perature control, and tempera-s ranging from 300 to 650 de-s Fahr.

iphenyl-diphenyloxide, or Dow-m, is an amber liquid, which n heated forms a vapor. This or carries latent heat, and upon ng cooled condenses liberating a mendous amount of heat. That m is an ideal heat transfer lium has long been demonstrated. vtherm vapor to all intents and poses is steam but in a higher perature range, and will give h temperatures at low pressures. the latter reason, the authors lained, the boiler solves many icult high-temperature applica-ns. Furthermore, the vapor tem-ature at a given pressure is al-ys the same, so by controlling pressure of the vapor its tem-ature is also controlled.

hese boilers are being used for ny special heating applications, example, laboratory autoclaves; e oil kettles; asphalt kettles; nish kettles; paper rolls. In some tallations, the job can be done ter by circulating hot Dowtherm uid to produce temperatures not r 350 degrees Fahr. Among the plications of liquid phase heating automatic injection plastic mold- presses, asphalt tanks, paper l machinery, and wall board nufacturing equipment.

Recirculating air heating for gas-d industrial furnaces was de-ibed by Edward Stephenson Jr., face Combustion Corp., Detroit. ese furnaces, of recent origin, e advantage of the basic principle that the movement of large volumes of heated gases around objects to be heated results in heat transmission at rates, and with degrees of uniformity, hitherto unknown.

Masses of hot gasses are forced to flow around and over the materials, including steel parts or intricate assembles of ferrous and nonferrous metals. These gases are forced around in a closed system, some means is provided to move them mechanically, some means to heat, and some means to control the absorption of heat by the products in the furnace chamber.

According to Mr. Stephenson, furnace structures are of steel and for the most part are portable. All forms of linings are employed, dependent upon temperature, expected life and capitol investment. Various forms of conveying mechanisms are used, including woven wire belt, articulated link belt, apron conveyor, pen pusher, shoe pusher, roller hearth, walking beam, overhead or under chain. A good heater is one which has minimum storage, that is the amount of heat to bring the heater to temperature is at a minimum. Burners are selected to do the job properly and efficiently. Fans force the air around and temperature of the air is regulated by a control system.

Luminous Flame Applications

Luminous flame and its application on furnaces was discussed by J. E. Dare, Public Service Co. of Northern Illinois, Streator, Ill. This type of flame is obtained by admitting little or no primary air to the burner, and by controlling the velocity of air and gas streams or speed of mixing, the length of flame as well as luminosity can be controlled within desired limits.

Presence of a great number of glowing or incandescent carbon particles in the gas stream increases the radiation from the flame to the work or rate of heat transfer. At the higher temperatures, the radiation power of a luminous flame is about 4 to 6 times as great as a nonluminous flame of the same temperature.

Advantages of luminous flame heating were cited by Mr. Dare as: An increased rate of heat transfer; more uniform temperature control; less maintenance of refractories; greater degree of turn down of burners; and formation of scale which requires much less trouble to remove as well as reduction in the amount of scale.

Successful applications of luminous flame combustion in the steel industry include: Heating stock for rolling mill work; heating stock for forging work; soaking pits; open hearth melting; heating for annealing, normalizing and hardening; side firing of galvanizing pots; and miscellaneous high temperature processing.

The matter of producing nonoxidizing or reducing atmospheres within furnaces treating ferrous and nonferrous metals. To this end, the American Gas association testing laboratories, Cleveland, have been and are studying the nature of these atmospheres and the methods by which they can be produced by combustion of industrial gas. A progress report on work so far completed was presented by L. O. Howell, industrial engineer with the laboratory.

Flue Gas Oxidizes Steel

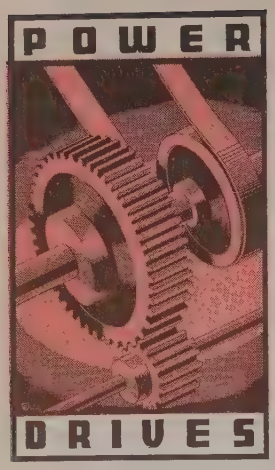
It was pointed out that CO_2 found in the flue gases obtained by burning coke oven gas with 60 per cent of the air required for combustion will oxidize steel at all temperatures considered. A nonoxidizing condition can be obtained only by fixing the flue gases at a high temperature and removing the water vapor. This removal of water vapor is one of the essential operations of some of the atmosphere machines now on the market.

Present status of prepared atmospheres in industrial heating was reviewed by B. W. Gonser, Battelle Memorial institute, Columbus, O. In the case of medium carbon steels, the important matter is to remove CO_2 in the atmosphere. Frequently it is necessary to protect steel and other metals which must be treated in gas-fired furnaces not equipped for atmosphere control, and for this, the speaker suggested applying some suitable mechanical coating to the parts.

Gas heated equipment is admirably suited to the drying or baking or lacquers, japan and other metal finishes, stated P. J. Ziegelbaur, Pontiac Varnish Co., Pontiac, Mich. He predicted that drying time would be speeded up in the future by development of quicker-drying finishes.

Offering advice on how to get the most from outside sales aids, W. H. Eisenman, secretary, American Society for Metals, Cleveland, established three principles: (1) Keep customers satisfied with their service and equipment; (2) advertise service and equipment adequately; and (3) attend and participate in conventions and expositions.

F. H. Trembly Jr., Philadelphia Gas Works Co., Philadelphia, is chairman of the industrial gas section, American Gas association; F. T. Aainey, Ohio Fuel Gas Co., Columbus, O., is vice chairman; and E. D. Milner, American Gas association, New York, is secretary.



Mill Drive Problems

How several rather unusual drive problems were solved effectively by use of newly developed equipment is detailed. Alternating current motors find wider application

By CHARLES P. CROCO
Steel Mill Engineer
Westinghouse Elec. & Mfg. Co.
East Pittsburgh, Pa.

■ A STEEL fabricating company decided to install a welder for welding seams in tanks. This required that a gantry crane be supplied to carry the welding head over the tank. Both sides of this crane had to be driven, but to gear them together would require approximately 20 feet rise, across 20 feet, and down 20 feet, with much shafting and bevel gearing. In addition, the drive required a speed range of 12 to 1. While only a small amount of power had to be transmitted, the cost of gearing and shafting seemed high.

It was decided to use a 5 horsepower, alternating current motor to drive both sides and to use a variable speed transmission to obtain the 12-to-1 speed range. The low speed shaft of this transmission unit was geared down to the drive wheel on one side, through approximately 3000-to-1 gearing. But instead of using bevel gears and shafting to drive the other side, a synchro-tie was used. The transmitter was connected to the variable speed transmission. The receiver was then connected through an identical gear train to the drive wheel on the other side of the gantry crane. Thus the two sides were driven in synchronism with the only tie between the two legs being the electric wiring.

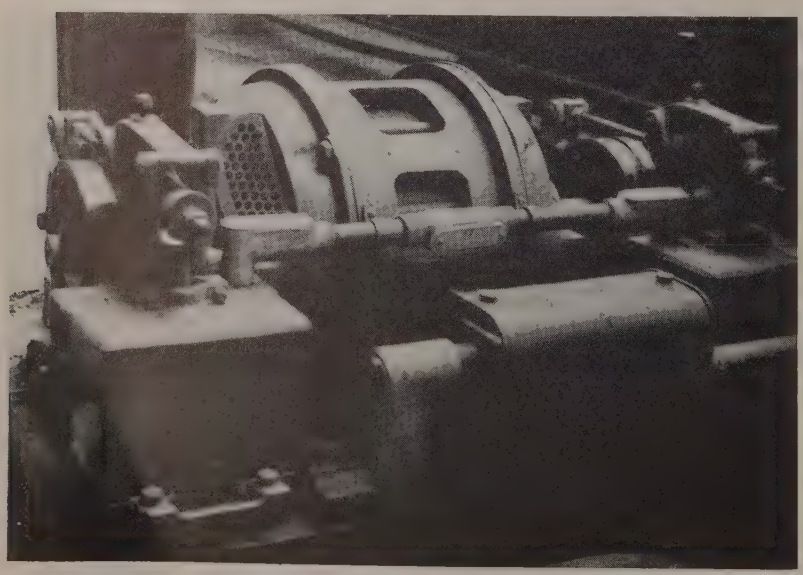
For years the use of alternating current power for steel mill auxiliaries was limited to such constant speed drives as pumps and fans. Almost all of the rest of the steel mill auxiliary drives, such as those that required frequent starting and stopping or those that were of such a nature as to require adjustable speed drives, were almost invariably driven by direct current motors.

In the last few years, improvements in the design of cons speed and multispeed squirrel induction motors, such as low rush and high starting torque, h given the application engineer a tool to solve many problems could formerly be solved only direct current motors. Not only better operating characteristics the alternating current motors, the material savings in first have led to the use of such mo in a number of interesting indust applications.

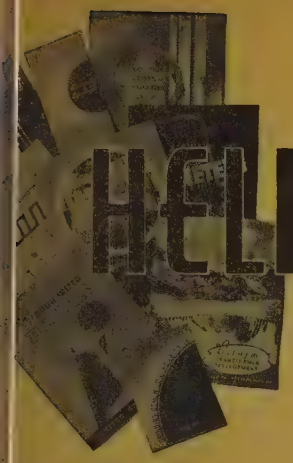
Replaces Direct Current Moto

For years the tong carriage tube or rod draw benches has b returned by hand on the sma benches, or by the use of a di current motor on the larger benc The carriage return drive motor furnished with a dynamic-brak controller and a magnetic brake accurate stopping at the die bl More for the big saving in first than for any improvement in op tion, an alternating current m was applied to the tong carriage turn of an existing draw bench. T was a single speed motor and st were made with a magnetic br mechanism.

With the brake adjusted correc extremely accurate stops could made, but since no dynamic br ing could be used conveniently, br wear was more than on a cor ponding direct current drive. next carriage return drive to use alternating current motor theref was furnished with a 2-speed, al nating current motor. The carri then was returned at high sp until near the die block where a li switch automatically transferre to the low speed. The final stop



Alternating current motor used w two magnetic brakes and a cam li switch on a cropping shear



Have You Seen This HELPFUL LITERATURE?

Here are the latest industrial publications reviewed for your benefit. They are yours for the asking. There is no charge or obligation. Simply fill in the convenient coupon and return.

-Precision Lathe

he Monarch Machine Tool Co.—
age illustrated, plastic bound bul-
No. 183. A new 10 in. by 20 in.
itive precision lathe performing all
functions of larger lathes is an-
nced. Full page photographs
v this unit from every angle and
descriptive information on en-
ering and operating features and
plete specifications are given.

—Temperature Control

he Foxboro Co.—48 page illus-
ed bulletin No. 225. Factors gov-
ng the choice of temperature con-
lers and outlines of the types of
perated controllers for industrial
ds are discussed. Cut-away views
schematic drawings show construc-
features. The four classes of
mal systems are discussed. Engi-
ring data are provided.

—Disc Brake

tearns Magnetic Manufacturing Co.
llustrated loose leaf bulletin No.
. Style "DM" magnetic disc
ke, actuated by a magnet is de-
bed. Sectional illustrations and
ensional tables provide full infor-
ion.

—Pylets

The Pyle-National Co.—12-page il-
trated bulletin No. 1110. Rectan-
ar pylets for all industrial purposes
fully described. Sizes and types
available for every need. Includes
ensional tables and price list.

(5)—Copper Alloy

A. W. Cadman Manufacturing Co. —8 page illustrated bulletin on Cupaloy. This new copper alloy is said to be as strong and hard as steel and particularly applicable where high physical stresses and heavy electrical current are present. Physical properties are described and a table of applications is given.

(6)—Salt Bath Furnace

Ajax Electric Co., Inc.—12 page illustrated catalog No. 106. Ajax-Hultgren electric salt bath furnaces for cyanide hardening, liquid carburizing, hardening in neutral bath, selective hardening and annealing, tempering, hardening high speed steel tools, annealing and age hardening are fully described. Specifications of standard sizes are given.

(7)—Precision Grinders

The Dumore Co. — 26 page illustrated 1939 catalog. Full descriptions and specifications of hand and bench precision grinders are given. Numerous pictures of these units in operation are shown. Utility tools and accessories are also covered.

(8)—Welding Positioner

Cullen-Friestedt Co.—4 page illustrated bulletin WP-17. Fully adjustable, specially designed table for holding units for welding. Capacity up to 2500 pounds. Either manual or electric motor driven. Reduces welding costs.

(9)—Materials Handling

Mathews Conveyer Co.—32 page, case bound, illustrated book "Natural Laws Applied to Production." The history of materials handling and industry's development of processes is presented in narrative form. The second part of the book shows numerous industrial applications of Mathews conveyors and conveyor layouts.

(10)—Industrial Furnaces

Barkling Fuel Engineering Co.—60 page illustrated catalog No. 105. Explains the "Econotherm principle" used in design of Barkling industrial furnaces. Heating up time and fuel consumption are claimed to be reduced and more constant temperatures are attained. Other types of furnaces and quenching and washing equipment are also described.

(11)—Scales

Streeter-Amet Co. — Multi-page, loose leaf type illustrated folder. Full descriptive information of heavy duty and automatic scales for all types of industrial demands, together with capacity tables and dial and record keeping mechanisms are given.

(12)—Carbide Alloy

Metal Carbides Corp.—4 page illustrated bulletin. Describes a new tungsten carbide alloy for greater wear-resistance. Increased toughness and freedom from size limitations are major advantages. Application information is given.

EEL
ders' Service Dept.
West Third St.,
veland, Ohio

HHL
4-3-39

d me the literature I have circled below.

	2	3	4	5	6	7	8	9	10	11	12	13	14	15
6	17	18	19	20	21	22	23	24	25	26	27	28		

me _____

pany _____ Title _____

ress _____

_____ State _____

This card must be completely filled out.

FIRST CLASS
PERMIT No. 36
(Sec. 510 P.L. & R.)
Cleveland, Ohio

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

2c POSTAGE WILL BE PAID BY—

STEEL
Penton Building
CLEVELAND, OHIO

Readers' Service Dept.

HELPFUL LITERATURE

(13)—Centrifugal Pumps

Worthington Pump and Machinery Co.—Illustrated bulletin No. W-319-B1A. Describes high-pressure, forged-steel-casing, centrifugal pumps, for application to high pressure steam generating units. Several installation views, together with a list of important installations and conditions of service are included.

(14)—Rust Preventive

The Stop-Rust Co.—8 page bulletin describing "Stop-Rust." Three grades of this product are available for rust-proofing ferrous material in storage and in production. Also used for protection of plant equipment and tools. It is not a petroleum base product and is easily applied by several methods.

(15)—Paint

Harrington Paint Co.—6-page folder on "Glymmer", a paint for rough handling with high weather and chemical resistance, for steel. Heat resistance, inorganic acid and alkali proof, anti-corrosive, waterproof and overnight air drying, are a few of the characteristics claimed for this paint. Has about twice the coverage of red lead, and requires no primer.

(16)—Turret Lathes

Gisholt Machine Co.—12 page illustrated catalog No. 1073. Fully describes Gisholt 1L, 2L and 3L high production turret lathes. The 3L model is a new addition to this line, and is of greater capacity. Detail photographs and full specifications are included.

(17)—Ground Rod

Anaconda Wire and Cable Co.—20 page illustrated, fourth edition, publication No. C-14. Anaconda star ground rod and Everdur ground wire clamps for electrical grounding are fully described. Recommended methods of grounding, and full discussions of ground characteristics are included.

(18)—Bearing Bronze

Johnson Bronze Co.—72 page illustrated, thumb-indexed catalog No. 390. A comprehensive guide with progressive size listing of general purpose bearings, in 800 sizes, machine finished ready for assembly; over 350 sizes of Universal bronze cored and solid bars; over 230 sizes of electric motor service bearings and full information on lead-base and tin-base babbitt, cast bronze graphited bearings and plug type bearings.

(19)—Thermometers

C. J. Tagliabue Mfg. Co.—16-page illustrated catalog No. 1170. "Tag" dial-indicating thermometers for industrial applications in numerous styles are described. Specifications and standard dial ranges are shown. Contact alarms and auxiliary equipment are also described.

(20)—Hose

The De Vilbiss Co.—24-page illustrated catalog No. HD. This booklet takes the reader through the plant and describes each step in the manufacture of hose. Specifications are listed for each type of hose, and information for selecting hose for various uses are given. Accessories are also described.

(21)—Car Pullers

Stephens-Adamson Manufacturing Co.—8 page illustrated catalog No. 7738. Gives specifications, dimensions and required engineering information on how to select proper car pullers for various applications. Accessory equipment and hand and motor driven winches are also covered.

(22)—Rod Straightener

The American Foundry Equipment Co.—8-page illustrated bulletin No. 10. Construction, operating data and specifications of rod straighteners handling work from ⅜-inch to 2½ inches in diameter, and for shearing rods from ⅜ to 1½ inches in diameter, are given.

(23)—Industrial Trucks

Clark Tructractor Div.—8 page lustrated double-fold booklet. Clark Carloader method of materi handling is fully explained and scribed. Numerous shop photos a schematic drawings illustrate adv tages of this type of handling u Performance data are included.

(24)—Motor Chart

The Louis Allis Co.—4-page ill trated bulletin No. 515. Handy m tor application chart lists 26 differ types of motors and checks the pro type of motor recommended for ab 50 standard applications. Also alyzes starting, maximum and full l torque characteristics, speed regulat and other information.

(25)—Safety Cut-Out

Anchor Steel and Conveyor Co 4-page illustrated bulletin No. 3 Announces a new automatic overl safety cut-out for power drive p tection. Elimination of shear p saves time and labor. Can be stalled on pulley, silent chain spro et, roller chain sprocket, V-belt she or gear.

(26)—Temperature Indicator

Leeds & Northrup Co.—4-page lustrated catalog No. N-33A(5). new switchboard model, temperat indicator with self-contained switc for connecting any one of a num of couples to the measuring circuit announced and described. Porta and table models are also described

(27)—Drill Jig Bushings

Ex-Cell-O Corp.—8 page illustra bulletin No. 11881. Prepared espec ly for designers, with full data av able in easy-to-use form. Printed heavy cardboard for service. Headl press fit bushings, headless liners, fix renewable bushings and head press bushings are covered and priced.

(28)—Speed Lathe

Schauer Machine Co.—16 page lustrated bulletin No. 380. The Id speed lathe is designed especially finishing, polishing, burring or lappi small parts. Specifications and descriptive information are includ

---

STEEL
Readers' Service Dept.
1213 West Third St.,
Cleveland, Ohio

HHR
4-3-39

Send me the literature I have circled below.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28		

Name_____

Company_____ Title_____

Address_____

City_____ State_____

This card must be completely filled out.

FIRST CLAS
PERMIT No.
(Sec. 510 P.L.&
Cleveland, Oh

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

2c POSTAGE WILL BE PAID BY—

STEEL
Penton Building
CLEVELAND, OHIO

Readers' Service Dept.

by applying the magnetic at the low speed. This re- in less brake wear and much accurate stops without sacri- any of the high speed return. first motor was a 3 horse-, 1150 revoluion per minute, se, 60 cycle, squirrel cage, in- n motor, but on later drives otors were either 1½/3 horse-, or 2½/5 horsepower, at 575/ evolutions per minute.

cessful use of alternating cur- 2 speed motors on the carriage n drive led to the use of this f motor for the main drive of e draw bench. While alternat- rrent motors had been satis- y for the driving of low speed draw benches, with increased s it was difficult to catch the with tongs without breaking irect current motors had been for this purpose. The motor un at base speed until the draw been started. Speed then was sed to a predetermined draw- speed. This equipment was more expensive so it was de- to try a 2 speed, alternating nt motor for the main drive. A 75 horsepower, 2 speed motor used. In order to obtain con- us torque during transfer from o high speed, a two winding, speed type of motor was em- d. By bringing out both ends ch phase of both windings, a d transient was obtained.

l a further use of alternating nt in replacing direct current rs has been in the cropping . After considering both the a of the shear and the motor, umber of cuts to be made per te, and the actual shearing a motor having 160 pound- starting torque and a syn- ous speed of 600 revolutions minute was selected. Since it necessary to make accurate , after considering both the in- and the rating of the magnetic es available, it was decided to wo brakes.

ile every day brings the appli- n engineer new problems to be d, it is often only an old prob- presented from a new point of . The improvement in design uipment, together with the de- ment of new types, is always ing new and unusual methods lving these problems.

•

ide to Tariff Rules ued by Custom House

ustom House Guide, Custom se, New York, has issued its edition, including the exact ding of each of the 19 reciprocal e agreement rates of duty and r changes by executive or legis- e action under each paragraph affected, in the tariff act of 1930 section.

United States customs regulations have been completely revised in accordance with the customs administrative act of 1938. New rates of duties reflect the United Kingdom, Canadian and all previous reciprocal trade agreements and changes, opposite each of 30,000 commodities. A special section has been added, showing various acts, including import taxes and processing taxes applying to imported merchandise of products derived therefrom. Other sections have been revised to bring them up to date. It is available from the publisher at $15, plus postage.

Demand Charges Are Reduced

■ PARTLY through the help of instruments located about the plant and partly through the co-operation of the Philadelphia Electric Co., Leeds & Northrup Co., Philadelphia is heading off extra demand charges which in the past have cost $2000 a year on a load having normal maximum demand of 350 kilowatts.

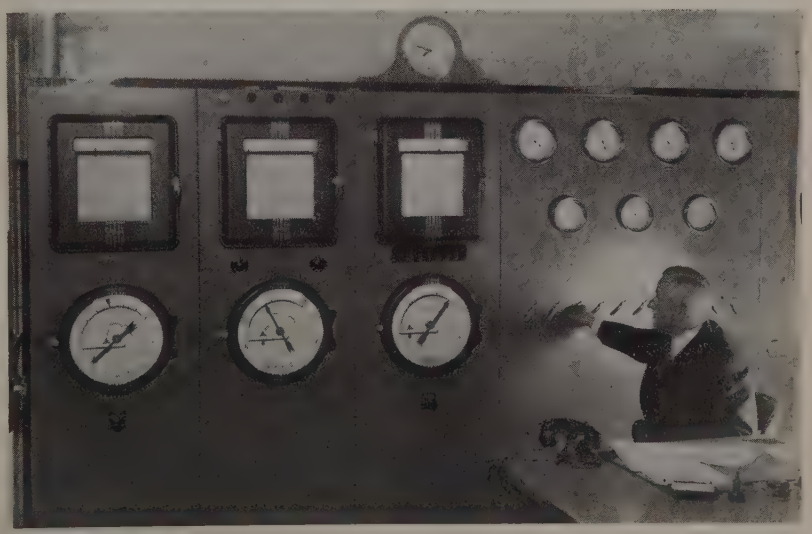
According to W. R. Coley, factory manager, Leeds & Northrup Co., in a recent issue of *Electrical World,* peak demand loads in this plant develop rapidly at irregular hours and may last only a few minutes. This makes it possible to hold the maximum demand interval within contract limits by cutting off part of the connected equipment automatically when a peak is reached.

Beside lighting and induction motor loads, there is considerable electric furnace load. Some of these furnaces can be shut down for several minutes at a time to provide ample over-peak-load reduction. The problem is to study demand under all plant operating conditions and arrange a schedule that shuts down the right furnaces in proper sequence and at the correct points on the load curve. To this end, an instrument panel shown in accompanying illustration has been installed across one wall of the maintenance engineer's office. On it, as shown, are three Micromax round chart recorders for load, for power factor and for voltage.

Load recorder is arranged to show either lighting load, power load or total load as desired. When automatic load control is undertaken, the load recorder becomes the controlling element. Large blocks of noninductive, unity power factor furnace load cannot be dropped without considering its effect on power factor. The power factor recorder shows effect of such load loss and also the corrective effect of changes that are being made progressively in motor sizes and amount of capacitors in the plant. This instrument shows power factor on either phase of the 2-phase supply, or of total load.

A manual switch permits voltage recorder to show readings from any leg to ground of any power or lighting bank. Since voltage at the buses is affected quite largely by plant load, this instrument has obvious advantages in current-load studies.

If $2000 is saved yearly on excess demand charges, instruments will be paid for in nine months, a return of 133 per cent per year on the investment.



Instruments aid in cutting power costs. Left to right in lower row on first three panels—kilowatts, power factor and voltage Micromax recording instruments. At top are carbon dioxide and smoke density recorders and 16-point temperature recorder

Southern Iron and Steelmaking Reviewed at Birmingham Meeting

(*Continued from Page* 21)

be used the speaker warned. The degree of contamination often influences the choice of a lubricant. Where bath lubrication is employed a low-viscosity lubricant is advisable. The speaker recommended a lime grease for mills equipped with sprays inasmuch as the salt water often is forced into the bearings.

Some high-temperature greases provide normal lubrication; excess heat can be absorbed by the use of a low-viscosity oil. Effective lubrication tends toward a low maintenance cost, the speaker said. Many of the steel companies have maintenance engineers, and inasmuch as they have time to learn the quality and effective use of lubricants he urged that they be given the opportunity to co-operate with producers of lubricants.

The speaker did not recommend expensive lubricants for old style equipment. Red engine oil, he said, is found in most steel mills in two viscosities. It has a medium flash point and is used effectively for plain bearings and large reduction gears.

The time is past, he stated in conclusion, when the equipment manufacturer can build machines without first considering lubricating devices. The effort on the part of the steel producer to make quality material has led to the manufacture of better lubricants which are more economical in the end.

T. R. Moxley, general master mechanic, Wheeling Steel Corp., Steubenville, O., in discussing Mr. Mandy's paper, mentioned that lubrication is the problem of the maintenance man in case there is no lubricating engineer at the plant. He advocated the selection of proper lubrication to perform the proper function. Where greater production is demanded, lubricating problems are more complex, he stated. Abnormal production at old mills would not be possible were it not for oil companies producing better lubricants.

Metallic Bearing Seal

Under high-speed operation the presence of water is causing problems heretofore not encountered. Most mills are designed with a seal on the bearings to retain the lubricant. With a metallic seal only 1 per cent moisture reaches the bearing lubricant compared to 10 to 15 per cent under former practice. Because of condensation in the housing of large gear reduction sets, a lubricant of good densibility is preferred. High-pressure lubricants are costly and their use must be supervised carefully, the speaker pointed out.

Further discussion brought out the fact that while a safe operating temperature for E. P. lubricants should not exceed 225 degrees Fahr. the temperature should be kept as low as possible.

At the dinner in the evening, members and guests were welcomed by Robert Gregg, president, Tennessee Coal, Iron & Railroad Co. Speaking before a capacity audience, Mr. Gregg paid tribute to electrical engineers for the remarkable service rendered to mankind and emphasized that without their help, knowledge, and genius many of the things in the steel industry would be unknown.

Describes Soaking Pits

At the evening session, M. P. Burns, assistant fuel engineer, Tennessee Coal, Iron & Railroad Co., Ensley, Ala., as co-author with E. A. Hawk, fuel engineer of the same company, described the mechanical and electrical phases and the method of operation of new soaking pits installed at the Fairfield works of his company. Efficiencies ranging from 29.8 to 54.8 per cent were recorded in the detailed heat balances. Coke oven gas consumption was reported as averaging 400,000 B.t.u. He cited fuel input as ranging from 12½ million B.t.u. per hour to a holding consumption of 2 million B.t.u. per hour.

Pit temperatures, he explained, are controlled by thermocouples located in the waste-gas stream leaving the furnace, working back to regulate the rate of firing. The fuel-air ratio for each pit is controlled automatically. Flow charts are employed to check this ratio. Automatic regulation of the furnace pressure also is provided. A regulator, which controls a butterfly valve in the main gas supply line, maintains the uniformity in the fuel gas pressure. The movement of the pit cover automatically stops the fan supplying the combustion air while stoppage of the air flow causes the combustion control to shut off the fuel gas supply.

A technically trained man serves as pit operator and is responsible for the operation of all the controls. He also maintains a complete record of pit performance.

The speaker emphasized that the scale formation in the pits is of normal weight but uniform over the entire ingot. It is only necessary to clean out the pits every thi four weeks, fresh coke being every two days. In conclusio author mentioned that the f of the new automatic pits in low-fuel consumption and un heating.

Controlled heating of soakin makes for greater uniformi heating, lessens the scale los guards against washing o ingots. This was the contenti A.J. Fisher, fuel engineer, B hem Steel Co., Sparrows Point in discussing the foregoing p The lower B.t.u. fuels are best to regenerative pits and the h B.t.u. fuels to recuperative pit pointed out two schools of th in the heating of ingots. One is of the opinion that ingots s be heated in a reducing atmos and the other in an oxidizing a sphere. In the one case the is to scale heavily to eliminat surface defects. However, wh slabbing mill is available, this important; instead we strive to heat economy, he stated.

In speaking on "Southern Furnace Practice," J. E. Urqu general superintendent, Wood Iron Co., Woodward, Ala., s that southern pig iron manufa centers in Birmingham. Ore, and limestone are literally sid side, thus differing from nort practice. Close proximity of th to the plants make it unnece to stock winter supplies. In there are no stocking facilitie any of the plants in the district. mally, he stated, the ore is deliv from the mines to the stockhou the blast furnace. No car dum ore unloaders, transfer cars or bridges are required.

Ample Hematite Supply

The brown ores in the district are limited. The backbone of supply of ore is hematite and supply located in the Red Mour area is said to be ample for next 100 years. This ore, he poi out, varies in iron from 32 to 40 cent, silica from 11 to 22 per and lime from 10 to 9 per cent. lime content of the ore decre drastically in the deposits loc in the west and in the east of district.

The slag volume at the furn varies from 1900 to 2100 pounds ton of iron and accounts largely the high coke consumption at trict stacks. Until recently, l has been so cheap and the cos raw materials so low that there little incentive to modernize pl but this condition now has chan The speaker mentioned that so ern operators also have been tremely slow in bettering t preparation of ore for charg Normally it was put through crusher, crushed to 3 to 4 inc

then charged. However, in 1929 Woodward company installed a her and later a screening plant ding a secondary crusher and rted to the charging of finer erials.

e Republic Steel Corp. recently alled the first sintering plant in district, mixing the product the machines with the ore satisfactory results. This plant described in the Feb. 8, 1937, of STEEL. As a result of a re- ch program inaugurated at the dward plant relative to the hing of ore, there was effected crease in the coke consumption 50 pounds per ton of iron and increase of 14 per cent in the age produced.

r. Urquhart also stressed the that the preparation of coke been neglected in the Birming- district. All the coal used for requires washing. Only until re- years was the coal pulverized. ent practice involves passing the through a crusher to greak the oversize and then over a en. However, the first coke ening system at furnace bins is being installed by a district ducer of iron.

ll southern furnaces burdened on ic iron require checking the blast. speaker stressed the necessity loing this particularly when the nace is operated on basic or low con iron and when the hearth meter exceeds 14 feet.

igh humidity in the summer nths and high moisture in the ter months also have their effect the coke consumption. In view of fact the speaker is of the opin- that air conditioning of blast naces is an immediate require- nt. In fact, he announced that the odward Iron Co. is about to air dition one of its stacks.

Flue Dust Is High

lue dust is accumulated in large ounts at various stacks in the trict. Some furnaces, in fact, have n giving large amounts away e to the railroads for filling pur- es. The amount of wind blown high considering northern prac- , thus making for high flue dust duction.

as cleaning has not progressed any great extent. No plant here clean gas for underfiring coke ns. Small checkers, therefore are installed in the stoves. In basic n smelting the hot blast tempera- e usually is below 1200 degrees hr.

n conclusion, the speaker com- nted on what the future holds for uthern blast furnace practice. The ndency, he contended is toward er crushed ores and the sintering fines, the beneficiation of the lean s, installation of air conditioning stems, crushing a furnace coke and the charging of the small size pieces separately, better ore and coke preparation, finer cleaning of gas and the installation of smaller checkers in the stoves.

In discussing this paper, J. M. Harris, superintendent of blast furnaces, Tennessee Coal, Iron & R. R. Co., stressed the importance of the proper preparation of raw materials. Furnace lines have been modified and obsolete equipment eliminated, he stated, though we have not accomplished what we had hoped. The preparation of raw materials and the proper sizing must be done inasmuch as by crushing the ore to a fine state, a greater area per unit of volume is exposed.

Tuesday members and guests visited all the properties of the Tennessee Coal, Iron & Railroad Co. The trip to and from the plants, covering more than 34 miles, was made by train. Lunch was served in the annealing department of the new continuous mill at Fairfield works.

♦

Foundry Association Proceedings Issued

■ *Transactions of the Amerian Foundrymen's Association*, 1938, edited by R. E. Kennedy and N. F. Hindle; cloth, 948 pages, 6 x 9 inches; published by the American Foundrymen's association, 222 West Adams street, Chicago, and supplied to members for $3, to nonmembers for $15.

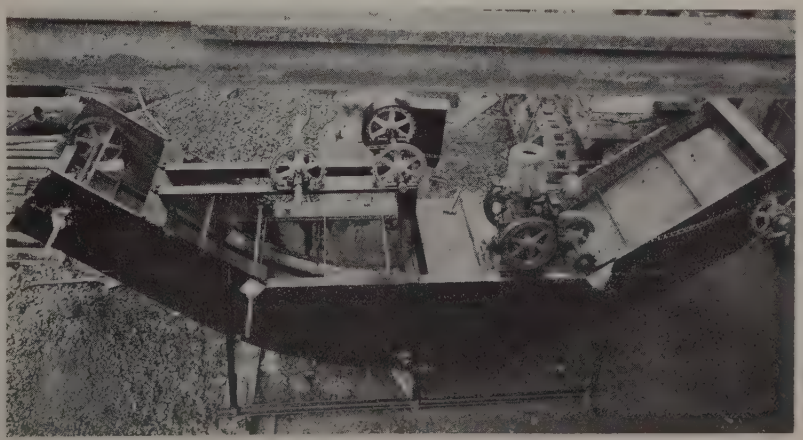
This is the annual bound volume containing papers and reports presented at the 1938 convention of the association. It contains 45 papers and reports and resulting discussions. The papers cover a wide range of subjects pertaining to various branches of the foundry industry, including gray cast iron, malleable cast iron, and steel. In addition the book contains papers on foundry refractories, patternmaking and materials handling. While many of the papers are technical, the practical side of the foundry has not been neglected in other papers in this volume.

Separates Unburned Fuel From Clinkers in Ashes

■ C. E. Pool and H. E. Davisson, Clarksburg, W. Va., have developed and patented a machine for recovering unburned coke from producer gas plant ash, power plant pan ash, coke breeze dumps and general industrial ash dumps. The principle of fuel recovery employed is based on specific gravity, flotation being the method of separating combustible material from clinkers.

The Pool separator is said to operate with economy and is mobile and self-contained. As shown in the accompanying illustration, it consists principally of a curved-frame tank and a simple conveyor system for carrying good fuel out one end and waste materials out the other. The upward curved floor and straight sides of the tank form conveyor chutes. Machine can be fed with pan ash or similar material by two men with shovels or by a conveyor. Ash is dumped into center of the tank, where it separates immediately into combustibles, specific gravity of which is less than that of water, and clinkers, which are heavier than water. Maximum separation is attained by adding lime, chalk, fireclay, loam, carbide slime or other materials until density of the water has been increased to a hydrometer reading of about 25 Baume A. An endless conveyor, having 24 flights, travels 100 feet per minute to give this machine a theoretical capacity of 71 cubic yards per hour.

Using variation in specific gravity as its principle of operation, this machine separates ashes into unburned combustible materials and clinkers. It has been found that most ash dumps contain over 50 per cent coke

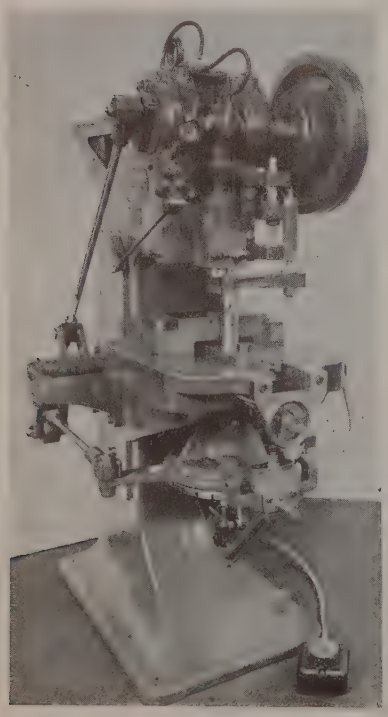


Changes Made in High Speed Notching Presses

■ V & O Press Co., Hudson, N. Y., has announced several changes in its high speed notching presses and fixtures.

One feature is a solenoid used to trip the machine and stop it at end of cycle, working in conjunction with a limit switch. Foot switch makes it possible to operate machines without undue fatigue. Limit switch automatically releases solenoid and stops machine at end of cycle eliminating all throwout mechanism previously used.

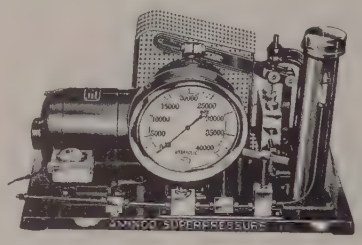
Another feature is an expanding disk holder. This holder makes the notching of laminations possible without a keyway. Holder is made similar to a split collet, being opened by means of a draw-in bolt which is actuated by solenoid. At end of cycle draw bolt is released permitting disk holder to contract and leaving the notched lamination loose on spindle. It is claimed considerable time is saved, as it is not necessary to line up slots in relation to keyway. Easier loading and unloading of laminations also is permitted.



Hydraulic Pump for High Test Pressures

■ American Instrument Co., Silver Spring, Md., has announced a new motor driven, hydraulic pump capable of developing pressures up to 30,000 pounds per square inch.

Pump is used for creating very high test pressures for determining bursting strength of cylinders and spheres; for operating high pressure and hydraulic intensifiers and



for carrying out experiments to determine effect of extremely high pressures and sudden releases on various materials.

Thread Grinder Feed Compensates for Truing

■ Jones & Lamson Machine Co., Springfield, Vt., has announced a universal thread grinding machine, designed to grind threads of every type up to 5 inches diameter, 12 inches long, anywhere on work 24 inches in length. Machine swings work 7 inches in diameter and accommodates 30 inches between centers.

This unit has been designed around an automatic wheel truing device. Accuracy of thread angle is maintained within plus or minus 5 minutes on the half-angle, lead to plus or minus 0.0002-inch with a cumulative error not exceeding 0.001-inch in 12 inches. On production work machine is said to grind threads automatically to a pitch tolerance of 0.0005-inch.

Grinding wheel spindle and its driving motor are mounted on a cradle to permit tilting wheel to correspond with helix angle of the thread to be ground. Spindle speed changes are made through sliding

gears, with positive forward a
verse speeds provided for tw
grinding of any thread with
machine's capacity. Tailstoc
lever-operated unit, and is a
able on the work slide. Wit
able formers, machine will
combinations of taper, straigh
taper, or double taper thread

Work drive, with pushbutto
trol, is powered by a motor g
to furnish power to revolve
and for table travel. Mach
equipped to feed in the gri
wheel automatically until c
size is reached. Wheel is adv
automatically also to compe
for decrease in its size after t

Announces Natural G Conversion Attachme

■ Caterpillar Tractor Co., P
Ill., has announced a natura
conversion attachment for it
cylinder, 125-horsepower dies
gines.

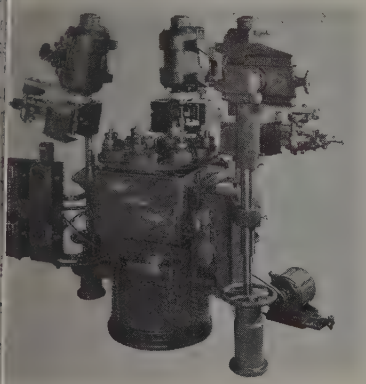
Attachment is characterize
simplicity. To change from
to natural gas, pistons do not
to be touched nor do any ch
have to be made to interior
of engine. Diesel cylinder hea
jection valves and lines ar
moved and replaced with a s
head, lowering compression
providing spark plugs. Diese

ction pumps are replaced by a gneto, and a carburetor is added he intake air line. It is claimed ire process takes about four irs. To change back to diesel is ially simple.

evelops New Polishing nd Buffing Machine

Hammond Machinery Builders ., Kalamazoo, Mich., has added its line the type "J" Model S tomatic polishing and buffing chine. Autodopers, which autotically apply composition to the eels can be used on this maine.

Machine will carry from 1½ to -horsepower motors. Although imarily designed for rounds up 6⅝ inches diameter, which are



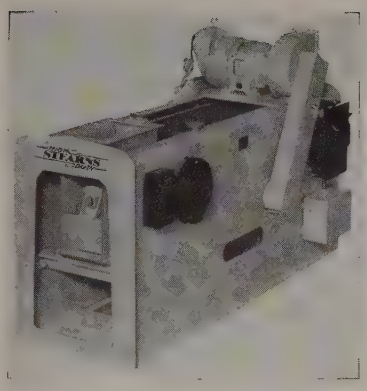
eld by mechanical fixtures, and ats up to 3 x 6 inches held by agnetic chucks, some rounds can e handled up to 10⅝ inches diamter and larger and odd shape flats.

Rotated table has 8 revolving pindles connected by chain sprockt drives to ball bearing worm reucing unit. For loading and unading, however, the three spindles t operator's station cease revolvng. Table is driven by ½-horseower motor with V-belt drive, aving variable pitch sheaves for uick and easy change of table inexing speeds.

Machine has a capacity of about 800 pieces per hour, depending on ature of work.

mproves Efficiency and Appearance of Separator

■ Stearns Magnetic Mfg. Co., Milwaukee, has announced improvement of its Type AM magnetic eparator, both in its operating efficiency and in its appearance. This nit is employed largely in the reatment of magnetite ore, roasted ematite, sponge iron, bronze



powder, etc., and for the removal or reclamation of fine iron.

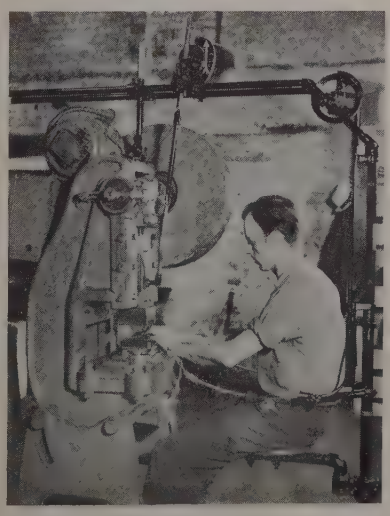
Instead of the old style bolted open frame, separator now is enclosed in a streamlined welded steel housing. An added feature is the vibrating feeder device that provides accurate control of the material being treated and affords uniform speed in desired thicknesses for most effective magnetic separation.

Keeps Hands of Press Operators Out of Danger

■ Positive Safety Mfg. Co., 4408 Perkins avenue, Cleveland, has developed a punch press safety device which keeps operator's hands out of the danger zone by means of steel-cored cables which pull his hands away from the die during the stroke of the ram.

There is no interference in the handling of stampings. Operator can feed to the dies as fast as he can operate the press. Pull-back is adjustable in conformity with the dies. Operator, after placing stamping between the dies, naturally takes his hands to a safe position when reaching for material. There is no jerk unless he is in actual danger.

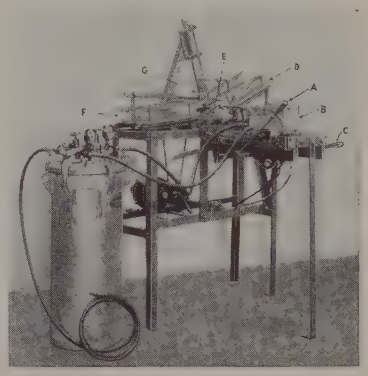
In illustration device is shown mounted on the floor. Where floor space is limited, it can be supported from an overhead beam or attached directly to the ceiling. These devices may be applied successfully to punch presses, toggle presses, drop hammers and embossing presses.



Spray Machine Finishes Inside of Cylinders

■ Eclipse Air Brush Co., 390 Park avenue, Newark, N. J., has added to its line a machine for the semi-automatic spray coating of the inside of small cylindrical objects such as paper or metal cans.

Cylinders feed by gravity down an adjustable slide and are released by a manually operated lever onto a



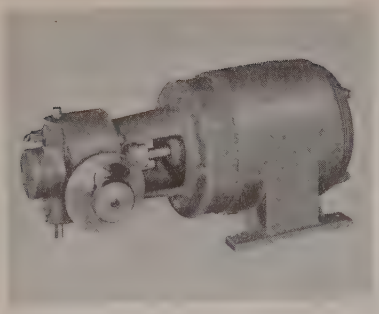
rotating device. A solenoid-operated spray gun fitted with an extension nozzle then is moved forward to coat the inside, while the cylinder is being rotated. Gun is pulled back and the next cylinder comes down, pushing the finished one on its way. A 1/6-horsepower motor operates the automatic part of the equipment.

An average production of 10,000 pieces per 8-hour day is said to be possible with this machine.

Hydraulic Pump Provides Accuracy of Control

■ Denison Engineering Co., Columbus, O., has announced a small variable volume hydraulic pump which provides for accuracy of control to a minimum of 5 cubic inches per minute.

Pump has three-piston cylinder body and rotary valve combined in a single shaft. Shaft and rotary are heat-treated tool steel, supported in one roller bearing and one ball bearing. Valve plate is hydraulic bronze, especially developed for this purpose. Motor drives pump through a standard flexible coupling, spider of



which is easily and economically replaceable.

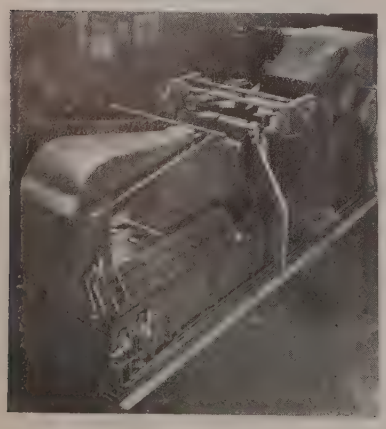
Pump is claimed to be good for continuous operation at 1000 pounds per square inch and for intermittent operation at 2000 pounds per square inch. It is built in two volume capacities, 100 cubic inches and 175 cubic inches.

Machine Adaptable to Many Bending Operations

■ Cyril Bath & Co., 6982 East Seventieth street, Cleveland, have developed an interesting tool for metal forming, first introduced in connection with the manufacture of refrigerator cabinets. It can be applied also to other forms of bending where it is desired to form curved sections of flanges, or tee or channel shapes members or tubing, with a minimum distortion of shape or wrinkling of the material.

In forming a tangent bent corner of a refrigerator case, 18-gage strip is received with the flanges rolled. It is put into the machine and located by a notch in the rear flange. Blankholder then moves forward and locks sheet in position into a curved die, which forms the top crown of the refrigerator. Guide rollers then are forced around tangent plates, completing crown and sides of the cabinet in one motion Production rate of about 120 pieces an hour was attained with this bender.

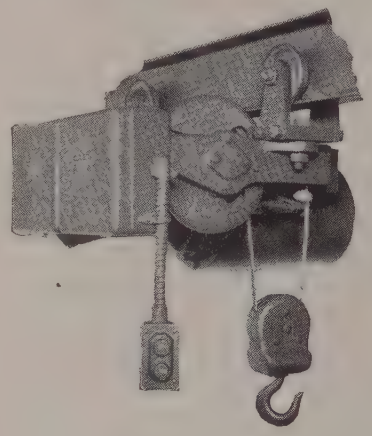
Use of this method is said to simplify assembly and welding problems. Basic principle involved is that of rolling a guided flat shoe around material being formed and encasing material while action is in progress. The new universal machine is adaptable in different sizes to a variety of bending problems.



Two-Speed Hoist Has Low Headroom Design

■ Electro Lift Inc., 30 Church street, New York, has placed on the market a two-speed alternating current hoist, designed to give slow speeds for starting, inching, running and stopping, and fast speeds for rapid and efficient handling.

Hoist has a squirrel-cage motor, and is built in sizes of ¼ to 6-tons. It may be equipped with traveling



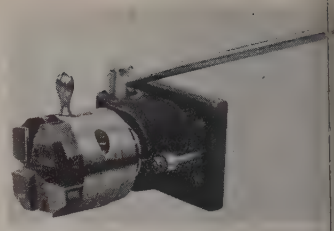
rope guide on drum to eliminate hazard of crossed or piled up cables where loads are pulled at an angle.

It has worm drive with worm and wheel running on tapered roller bearings, fully enclosed within the gear case and running in a bath of oil. This provides simple construction and quiet operation. Motor has ball bearings and is attached directly to hoist frame. Entire load is carried on cast steel frame. Hoist has close headroom, allowing the hook to reach within a minimum distance of overhead track. Control may be either rope or pushbutton type.

Adapter for Die Head Permits Floating Action

■ Landis Machine Co., Waynesboro, Pa., has announced a new type sliding adapter for effecting better application of Landmatic heads to heavy duty turret lathes. Adapter not only permits a floating action for the die head but also provides a gear mechanism for starting the die head onto the work by hand.

With this device the forward or



thread starting movement o die head is accomplished th an intermediate gear mecha contained within the adapte rack gear is milled axially alon peripheral surface of a bushi which the die head shank is A pinion gear, whose teeth e the rack gear, is fitted with a handle which is used to ac movement of the bushing. Die is opened automatically by a which extends through a tudinal slot in the adapter hou

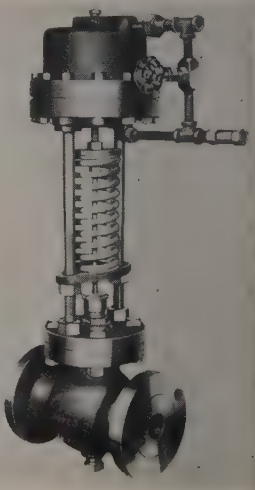
Use of this adapter is said t sure good starting action fo head and to improve lead quality of the thread.

Governor Designed fo Reciprocating Pumps

■ Northern Equipment Co., Pa., has developed a pump gove especially designed for servic steam-driven reciprocating p or on centrifugal pumps drive small steam turbines.

Governor is spring-loaded to vide accuracy in pressure co Balanced bevel-seating valve p also gives assurance of instan sponse to pressure variations. ply brass syphon bellows, the ating element, is protected ag water hammer or sudden cha in pressure by a stabilizer.

Furnished in sizes from ¾-in 3 inches, in 250 and 300-pound sure standards only.



Outlook Clouded By Lag In Sales

March Lacks Seasonal Recovery; Output Off Further

MARKET IN TABLOID ★

Demand

Generally steady or lower compared with month ago.

Prices

Steady on steel products; scrap tone easier.

Production

Dropped 1 point to 54½ per cent.

BSENCE of expected improvement in steel demand ing March tends to cloud the outlook for the new rter.

Vith only a few exceptions, last month's business no more than hold its own at the February rate, in some instances a decrease occurred. Small iations in steel buying the past 30 days are re- ted in the scant improvement in ingot output dur- March.

Nevertheless, ingot production the first quarter in- ased nearly 70 per cent over the corresponding 8 period, despite a progressively smaller gain com- ed with a year ago as the quarter advanced. The rease from the like period of 1937 was more than per cent. Steelmaking last week declined 1 point to ½ per cent. This compares with 36 per cent a ur ago.

Daily average pig iron production in March is esti- ted at 77,182 tons, compared with 73,578 tons in bruary and 47,426 tons in March, 1938. The gain er last year was nearly 63 per cent. Total output first quarter was 6,628,235 tons, an increase of per cent over the 4,221,406 tons produced a year o.

Disposition of steel users to restrict orders to early eds is seen in the decrease in size of individual pur- ases the past month. In the East, finished steel es in March were slightly ahead of February, but ne producers did 65 per cent of the month's busi- ss in the first half, indicative of the letdown the past o weeks.

ructural Shape Demand esists Slower Tendency

Structural steel has been more active lately and omises to be a sustaining factor in steel production is spring. Concrete reinforcing bar shipments and ospective business also are maintained at relatively gh levels. Tin plate demand, while in some in- ances falling below earlier expectations, appears as- ired of further seasonal gains shortly. Production rrently is at 60 per cent.

A letdown in sheet and strip buying reflects to a rge extent the continuation of slow demand from the automotive industry. Motorcar assemblies last week declined about 3400 units to 85,980, following four consecutive weekly increases. Output a year ago was 57,500 units. March production was more than 60 per cent ahead of the 1938 month. With the exception of last year assemblies were the smallest for March since 1934 and almost 5 per cent below the March average for the past five years.

All leading makers shared in last week's decline in automotive operations. General Motors cut from 35,230 units to 33,260; Chrysler from 20,825 to 20,375; Ford from 22,350 to 22,230; and all others from 10,995 to 10,115.

Railroad Equipment Buying Slow; More Rails Ordered

Markets for railroad materials continue quiet. Closing on contemplated freight car orders by various roads still is awaited, and in the meantime only moderate steel tonnages are being taken for repair purposes. Union Pacific is going ahead with plans to build 300 flat cars in its own shops, and the Southern Pacific has placed two streamlined passenger trains.

Rail production is sustained, and the decline in backlogs has been arrested partially by orders from two roads. These are 9000 tons for the Chicago & North Western and 4000 tons for the Virginian.

Last week's decrease in ingot production occurred in the face of heavier operations at some centers. Pittsburgh increased 1 point to 49 per cent; Wheeling was up 3 to 66 per cent; Buffalo rose 4½ points to 42; and Detroit advanced 2 to 74. Eastern Pennsylvania was unchanged at 40 per cent and Cleveland held at 52½.

On the other hand, Chicago was down 3 points to 53½ and Youngstown dropped 4 points to 50. Reductions in other districts included 16 points to 62 at Birmingham, 15 points to 50 in New England, 4 points at Cincinnati to 51 and 14½ points at St. Louis to 43.

Scrap prices are fairly steady, despite an easier tone than prevailed a few weeks ago. The scrap composite is unchanged at $15.04. Finished steel prices are holding, the composite standing at $56.50.

COMPOSITE MARKET AVERAGES

	Apr. 1	Mar. 25	Mar. 18	One Month Ago Mar., 1939	Three Months Ago Jan., 1939	One Year Ago Apr., 1938	I Year Apr
Iron and Steel	$36.42	$36.42	$36.39	$36.40	$36.36	$38.61	$3
Finished Steel	56.50	56.50	56.50	56.50	56.50	61.70	5
Steelworks Scrap..	15.04	15.04	14.96	14.98	14.77	12.30	1

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, pipe, rails, alloy steel, hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year

Finished Material

	April 1, 1939	March 1939	Jan. 1939	April 1938
Steel bars, Pittsburgh	2.25c	2.25c	2.25c	2.45c
Steel bars, Chicago	2.25	2.25	2.25	2.50
Steel bars, Philadelphia	2.57	2.57	2.57	2.765
Iron bars, Terre Haute, Ind.	2.15	2.15	2.15	2.35
Shapes, Pittsburgh	2.10	2.10	2.10	2.25
Shapes, Philadelphia	2.215	2.215	2.215	2.465
Shapes, Chicago	2.10	2.10	2.10	2.30
Plates, Pittsburgh	2.10	2.10	2.10	2.25
Plates, Philadelphia	2.15	2.15	2.15	2.445
Plates, Chicago	2.10	2.10	2.10	2.30
Sheets, hot-rolled, Pittsburgh	2.15	2.15	2.15	2.40
Sheets, cold-rolled, Pittsburgh	3.20	3.20	3.20	3.45
Sheets, No. 24, galv., Pittsburgh	3.50	3.50	3.50	3.80
Sheets, hot-rolled, Gary	2.15	2.15	2.15	2.50
Sheets, cold-rolled, Gary	3.20	3.20	3.20	3.25
Sheets, No. 24, galv., Gary	3.50	3.50	3.50	3.90
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.90
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.35
Wire nails, Pittsburgh	2.45	2.45	2.45	2.75

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$37.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	37.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	37.00
Wire rods, No. 5 to $\frac{9}{32}$-inch, Pitts.	43.00	43.00	43.00	47.00

Pig Iron

	April 1, 1939	March 1939	Jan. 1939
Bessemer, del. Pittsburgh	$22.34	$22.34	$22.34
Basic, Valley	20.50	20.50	20.50
Basic, eastern, del. Philadelphia	22.34	22.34	22.34
No. 2 foundry, Pittsburgh	22.21	22.21	22.21
No. 2 foundry, Chicago	21.00	21.00	21.00
Southern No. 2, Birmingham	17.38	17.38	17.38
Southern No. 2, del. Cincinnati	20.89	20.89	20.89
No. 2X, del. Phila. (differ. av.)	23.215	23.215	23.215
Malleable, Valley	21.00	21.00	21.00
Malleable, Chicago	21.00	21.00	21.00
Lake Sup., charcoal, del. Chicago	28.34	28.34	28.34
Gray forge, del. Pittsburgh	21.17	21.17	21.17
Ferromanganese, del. Pittsburgh	85.33	85.27	90.25

Scrap

Heavy melting steel, Pittsburgh	$15.75	$15.75	$15.60
Heavy melt. steel, No. 2, E. Pa.	13.75	13.375	13.25
Heavy melting steel, Chicago	14.25	14.25	13.75
Rails for rolling, Chicago	17.25	17.25	17.75
Railroad steel specialties, Chicago	16.25	16.25	16.00

Coke

Connellsville, furnace, ovens	$ 3.75	$3.75	$3.75
Connellsville, foundry, ovens	5.00	5.00	5.00
Chicago, by-product fdry., del.	10.50	10.50	10.50

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Except when otherwise designated, prices are base, f.o.b. cars.

Sheet Steel

Hot Rolled

Pittsburgh	2.15c
Chicago, Gary	2.15c
Cleveland	2.15c
Detroit, del.	2.25c
Buffalo	2.15c
Sparrows Point, Md.	2.15c
New York, del.	2.39c
Philadelphia, del.	2.32c
Granite City, Ill.	2.25c
Middletown, O.	2.15c
Youngstown, O.	2.15c
Birmingham	2.15c
Pacific Coast points	2.65c

Cold Rolled

Pittsburgh	3.20c
Chicago, Gary	3.20c
Buffalo	3.20c
Cleveland	3.20c
Detroit, delivered	3.30c
Philadelphia, del.	3.52c
New York, del.	3.54c
Granite City, Ill.	3.30c
Middletown, O.	3.20c
Youngstown, O.	3.20c
Pacific Coast points	3.80c

Galvanized No. 24

Pittsburgh	3.50c
Chicago, Gary	3.50c
Buffalo	3.50c
Sparrows Point, Md.	3.50c
Philadelphia, del.	3.67c
New York, delivered	3.74c
Birmingham	3.50c
Granite City, Ill.	3.60c
Middletown, O.	3.50c
Youngstown, O.	3.50c
Pacific Coast points	4.00c

Black Plate, No. 29 and Lighter

Pittsburgh	3.05c
Chicago, Gary	3.05c
Granite City, Ill.	3.15c

Long Ternes No. 24 Unassorted

Pittsburgh, Gary	3.95c
Pacific Coast	4.65c

Enameling Sheets

	No. 10	No. 20
Pittsburgh	2.75c	3.35c
Chicago, Gary	2.75c	3.35c
Granite City, Ill.	2.85c	3.45c
Youngstown, O.	2.75c	3.35c
Cleveland	2.75c	3.35c
Middletown, O.	2.75c	3.35c
Pacific Coast	3.35c	3.95c

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No. 304
Bars	24.00	25.00
Plates	27.00	29.00
Sheets	34.00	36.00
Hot strip	21.50	23.50
Cold strip	28.00	30.00

Straight Chromes

	No. 410	No. 430	No. 442	No. 446
Bars	18.50	19.00	22.50	27.50
Plates	21.50	22.00	25.50	30.50
Sheets	26.50	29.00	32.50	36.50
Hot strip	17.00	17.50	23.00	28.00
Cold strip	22.00	22.50	28.50	36.50

Steel Plate

Pittsburgh	2.10c
New York, del.	2.29c
Philadelphia, del.	2.15c
Boston, delivered	2.42c
Buffalo, delivered	2.33c
Chicago or Gary	2.10c
Cleveland	2.10c
Birmingham	2.10c
Coatesville, base	2.10c
Sparrows Point, base	2.10c
Claymont, del.	2.10c
Youngstown	2.10c
Gulf ports	2.45c
Pacific Coast points	2.60c

Steel Floor Plates

Chicago	3.35c
Gulf ports	3.70c
Pacific Coast ports	3.95c
Pittsburgh	3.35c

Standard Shapes

Pittsburgh	2.10c
Philadelphia, del.	2.21½c
New York, del.	2.27c
Boston, delivered	2.41c
Bethlehem	2.10c
Chicago	2.10c
Cleveland, del.	2.30c
Buffalo	
Gulf ports	
Birmingham	
St. Louis, del.	
Pacific Coast points	

Tin and Terne Pl

Tin Plate, Coke (base b

Pittsburgh, Gary, Chicago	
Granite City, Ill.	

Mfg. Terne Plate (base

Pittsburgh, Gary, Chicago	
Granite City, Ill.	

Bars

Soft Steel

(Base, 3 to 25 tons)

Pittsburgh	
Chicago or Gary	
Duluth	
Birmingham	
Cleveland	
Buffalo	
Detroit, delivered	
Philadelphia, del.	
Boston, delivered	
New York, del.	
Gulf ports	
Pacific Coast points	

Rail Steel

To Manufacturing Tra

Pittsburgh	
Chicago or Gary	
Detroit, delivered	
Cleveland	

lo	2.10c
ngham	2.10c
ports	2.45c
c coast points	2.70c

Iron

go, Terre Haute	2.15c
delphia	2.47c
urgh, refined	3.50-8.00c

Reinforcing

billet, straight lengths, quoted by distributors

go, Gary, Buffalo	
ve., Birm., Young., rrows Pt., Pitts.	2.05c
it, delivered	2.15c
ports	2.40c
c coast ports	2.50c
delphia, del.	2.22c

ll steel, straight lengths, quoted by distributors

burgh, Gary, Chi- go, Buffalo, Cleve- d, Birmingham	1.90c
oit, delivered	2.00c
ports	2.25c
ic Coast	2.35c

re Products

-Cleve.-Chicago-Birm. base 100 lb. keg in carloads

dard wire nails	$2.45
ent coated nails	$2.45

(Per pound)

hed staples	3.15c
fence staples	3.40c
barbed wire, stand- d 12½ gage two- int hog, 80-rod spool .80; two-point cattle, -rod spool	$2.62
ealed fence wire	2.95c
fence wire	3.35c
en wire fencing (base L. column)	67.00
le loop bale ties, ase C. L. column)	56.00

To Manufacturing Trade

s, Pitts. - Cleve. - Chicago- irmingham (except spring wire)

ht bess., basic wire	2.60c
anized wire	2.65c
ng wire	3.20c

cester, Mass., $2 higher on right basic and spring wire. nails, C. L. Pitts. (0% disc. on all extras) $3.60

old-Finished Bars

	Carbon	Alloy
sburgh	2.70c	3.40c
cago	2.70c	3.40c
y, Ind.	2.70c	3.40c
roit	2.75c	*3.50c
veland	2.70c	3.40c
falo	2.70c	3.40c

Delivered.

loy Bars (Hot)

(Base, 3 to 25 tons)

sburgh, Buffalo, Chi- ago, Massillon, Can- on, Bethlehem 2.80c
roit, delivered 2.90c

.E.	Alloy Diff.	S.A.E.	Alloy Diff.
0	0.35	3100	0.70
0	0.75	3200	1.35
0	1.55	3300	3.80
0	2.25	3400	3.20

0 0.15 to 0.25 Mo. 150-
0 0.20 to 0.30 Mo. 1.50-
.00 Ni. 1.10
0 0.80-1.10 Cr. 0.45
0 Cr. spring flats 0.15
0 bars 1.20
0 spring flats 0.85
N., Van. 1.50
rbon Van. 0.85
0 spring flats 0.15
0 spring rounds, squares 0.40
Electric furnace up 50 cents.

ling

te., Chgo., Buffalo	2.40c
f ports	2.75c

Strip and Hoops

(Base, hot-rolled, 1 to 25 tons; cold-rolled, 3 to 25 tons)

Hot Strip, 12-inch and less

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, Birmingham	2.15c
Detroit, del.	2.25c
Philadelphia, del.	2.47c
New York, del.	2.51c
Cooperage hoop, Youngs., Pitts., Chicago, Birm.	2.25c
Cold strip, 0.25 carbon and under, Pittsburgh, Cleveland, Youngstown	2.95c
Chicago	3.05c
Detroit, del.	3.05c
Worcester, Mass.	3.15c

Carbon	Cleve. Pitts.
0.26—0.50	2.95c
0.51—0.75	4.30c
0.76—1.00	6.15c
Over 1.00	8.35c

Worcester, Mass $4 higher.

Commodity Cold-Rolled Strip

Pitts.-Cleve.-Youngstown	3.10c
Detroit, del.	3.20c
Worcester, Mass.	3.50c

Lamp stock up 10 cents.

Rails, Fastenings

(Gross Tons)

Standard rails, mill	$40.00
Relay rails, Pittsburgh 20—100 lbs.	32.50-35.50
Light rails, billet qual., Pitts., Chicago, B'ham.	$40.00
Do., rerolling quality	39.00

Cents per pound

Angle bars, billet, mills	2.70c
Do., axle steel	2.35c
Spikes, R. R. base	3.00c
Track bolts, base	4.15c
Car axles forged, Pitts., Chicago, Birmingham	3.15c
Tie plates, base	2.15c

Base, light rails 25 to 60 lbs., 20 lbs., up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

Bolts and Nuts

Pittsburgh, Cleveland, Birmingham, Chicago. Discounts to legitimate trade as per Dec. 1, 1932, lists, carloads 5% up; full containers additional 10%.

Carriage and Machine

½ x 6 and smaller	68.5 off
Do. larger, to 1-in.	66 off
Do. 1⅛ and larger	64 off
Tire bolts	52.5 off

Stove Bolts

In packages with nuts attached 72.5 off; in packages with nuts separate 72.5-12½ off; bulk 84 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts	60 off
Elevator bolts	60 off
Plow bolts	68.5 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
6-inch and less	67	70
⅜-1-inch	64	65
1⅛ and larger	62	62

Hexagon Cap Screws

Milled	50-10 off
Upset, 1-in., smaller	65-10 off

Square Head Set Screws

Upset, 1-in., smaller	73-10 off
Headless set screws	62-10 off

Rivets, Washers

Structural, Pittsburgh, Cleveland, Chicago	3.40c
½-inch and smaller, Pitts., Chi., Cleve.	65-10 off
Wrought washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l. $5.40; c.l. $5.75 off	

Welded Iron, Steel Pipe

Base discounts on steel pipe. Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less on lap weld, 1 point less on butt weld. Chicago delivery 2½ and 1½ less, respectively. Wrought pipe, Pittsburgh base.

Butt Weld

Steel

In.	Blk.	Galv.
½	63½	54
¾	66½	58
1—3	68½	60½

Iron

¾	30	13
1—1¼	34	19
1½	38	21½
2	37½	21

Lap Weld

Steel

2	61	52½
2½—3	64	55½
3½—6	66	57½
7 and 8	65	55½
9 and 10	64½	55
11 and 12	63½	54

Iron

2	30½	15
2½—3½	31½	17½
4	33½	21
4½—8	32½	20
9—12	28½	15

Line Pipe

Steel

1 to 3, butt weld	67½	
2, lap weld	60	
2½ to 3, lap weld	63	
3½ to 6, lap weld	65	
7 and 8, lap weld	64	
10-inch lap weld	63½	
12-inch, lap weld	62½	

Iron

	Blk.	Galv.
¾ butt weld	25	7
1 and 1¾ butt weld	29	13
1½ butt weld	33	15½
2 butt weld	32½	15
1½ lap weld	23½	7
2 lap weld	25½	9
2½ to 3½ lap weld	26½	11½
4 lap weld	28½	15
4½ to 8 lap weld	27½	14
9 to 12 lap weld	23½	9

Boiler Tubes

Carloads minimum wall seamless steel boiler tubes, cut lengths 4 to 24 feet; f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.

Lap Welded

Sizes	Gage	Steel	Charcoal Iron
1½" O. D.	13	$ 9.72	$23.71
1¾" O. D.	13	11.06	22.93
2" O. D.	13	12.38	19.35
2¼" O. D.	13	13.79	21.68
2¼" O. D.	12	15.16	.....
2½" O. D.	12	16.58	26.57
2¾" O. D.	12	17.54	29.00
3" O. D.	12	18.35	31.36
3½" O. D.	11	23.15	39.81
4" O. D.	10	28.66	49.90
5" O. D.	9	44.25	73.93
6" O. D.	7	68.14	.....

Seamless

Sizes	Gage	Hot Rolled	Cold Drawn
1" O. D.	13	$ 7.82	$ 9.01
1¼" O. D.	13	9.26	10.67
1½" O. D.	13	10.23	11.79
1¾" O. D.	13	11.64	13.42
2" O. D.	13	13.04	15.03
2¼" O. D.	13	14.54	16.76
2¼" O. D.	12	16.01	18.45
2½" O. D.	12	17.54	20.21
2¾" O. D.	12	18.59	21.42
3" O. D.	12	19.50	22.48
3½" O. D.	11	24.62	28.37
4" O. D.	10	30.54	35.20
4½" O. D.	10	37.35	43.04
5" O. D.	9	46.87	54.01
6" O. D.	7	71.96	82.93

Cast Iron Pipe

Class B Pipe—Per Net Ton

6-in., & over, Birm.	$42.00-43.00
4-in., Birmingham	45.00-46.00
4-in., Chicago	53.80-54.80
6-in. & over, Chicago	50.80-51.80
6-in. & over, east fdy.	46.00
Do., 4-in.	49.00

Class A Pipe $3 over Class B
Stnd. fitgs., Birm., base $100.00

Semifinished Steel

Rerolling Billets, Slabs

(Gross Tons)

Pittsburgh, Chicago, Gary, Cleve., Buffalo, Young., Birm., Sparrows Point	$34.00
Duluth (billets)	36.00
Detroit, delivered	36.00

Forging Quality Billets

6 x 6 to 9 x 9-in., base

Pitts., Chicago, Buffalo	40.00
Duluth	42.00

Sheet Bars

Pitts., Cleveland, Young., Sparrows Point, Buffalo, Canton, Chicago	34.00
Detroit, delivered	36.00

Wire Rods

Pitts., Cleveland, Chicago, Birmingham No. 5 to 9/32-inch incl.	43.00
Do., over 9/32 to 11/32-in. incl.	48.00

Worcester up $2; Galveston up $6; Pacific Coast up $9.

Skelp

Pitts., Chi., Young., Buff., Coatesville, Sparrows Pt.	1.90c

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.	$3.75
Connellsville, fdry.	4.75- 5.50
Connell. prem. fdry.	5.75- 6.25
New River fdry.	6.50- 6.75
Wise county fdry.	5.50- 5.75
Wise county fur.	4.50- 4.75

By-Product Foundry

Newark, N. J., del.	10.88-11.35
Chi., ov., outside del.	9.75
Chicago, del.	10.50
Milwaukee, ovens	10.50
New England, del.	12.50
St. Louis, del.	11.00-11.50
Birmingham, ovens	7.00
Indianapolis, del.	10.00
Cincinnati, del.	9.75
Cleveland, del.	10.30
Buffalo, del.	10.50
Detroit, del.	10.25
Philadelphia, del.	10.65

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	16.00c
Toluol, two degree	22.00c
Solvent naphtha	26.00c
Industrial xylol	26.00c

Per lb. f.o.b. Frankford and St. Louis

Phenol (200 lb. drums)	16.25c
Do. (450 lbs.)	15.25c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers	5.75c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$28.00

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25 sil.; 50c diff. below 1.75 sil. Gross tons.

Basing Points:	No. 2 Fdry.	Malle-able	Basic	Besse-mer
Bethlehem, Pa.	$22.00	$22.50	$21.50	$23.00
Birdsboro, Pa.	22.00	22.50	21.50	23.00
Birmingham, Ala.‡	17.38	.....	16.38	22.00
Buffalo	21.00	21.50	20.00	22.00
Chicago	21.00	21.00	20.50	21.50
Cleveland	21.00	21.00	20.50	21.50
Detroit	21.00	21.00	20.50	21.50
Duluth	21.50	21.50	.....	22.00
Erie, Pa.	21.00	21.50	20.50	22.00
Everett, Mass.	22.00	22.50	21.50	23.00
Granite City, Ill.	21.00	21.00	20.50	21.50
Hamilton, O.	21.00	21.00	20.50	.....
Neville Island, Pa.	21.00	21.00	20.50	21.50
Provo, Utah	19.00	.....	.....	.....
Sharpsville, Pa.	21.00	21.00	20.50	21.50
Sparrow's Point, Md.	22.00	.....	21.50	.....
Swedeland, Pa.	22.00	22.50	21.50	23.00
Toledo, O.	21.00	21.00	20.50	21.50
Youngstown, O.	21.00	21.00	20.50	21.50

‡Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

Delivered from Basing Points:

Akron, O., from Cleveland	22.39	22.39	21.89	22.89
Baltimore from Birmingham	22.78	.....	21.66	.....
Boston from Birmingham	22.12	.....	.....	.....
Boston from Everett, Mass.	22.50	23.00	22.00	23.50
Boston from Buffalo	22.50	23.00	22.00	23.50
Brooklyn, N. Y., from Bethlehem	24.50	25.00	.....	.....
Canton, O., from Cleveland	22.39	22.39	21.89	22.89
Chicago from Birminghom	†21.22	.....	.....	.....
Cincinnati from Hamilton, O.	21.24	22.11	21.61	.....
Cincinnati from Birmingham	21.06	.....	20.06	.....
Cleveland from Birmingham	21.32	.....	20.82	.....
Mansfield, O., from Toledo, O.	22.94	22.94	22.44	22.44
Milwaukee from Chicago	22.10	22.10	21.60	22.60
Muskegon, Mich., from Chicago, Toledo or Detroit	24.19	24.19	23.69	24.69
Newark, N. J., from Birmingham	23.15	.....	.....	.....
Newark, N. J., from Bethlehem	23.53	24.03	.....	.....
Philadelphia from Birmingham	22.46	.....	21.96	.....
Philadelphia from Swedeland, Pa.	22.84	23.34	22.34	.....
Pittsburgh district from Neville Island	Neville base, plus 69c, 84c, and $1.24 freight.			
Saginaw, Mich., from Detroit	23.45	23.45	22.95	22.95
St. Louis, northern	21.50	21.50	21.00	
St. Louis from Birmingham	†21.12	.....	20.62	
St. Paul from Duluth	23.63	23.63	.....	

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Standish, N $26.50, base; $27.74 delivered Philadelphia.

Gray Forge		Charcoal	
Valley furnace	$20.50	Lake Superior fur.	$
Pitts. dist. fur.	20.50	do., del Chicago	
		Lyles, Tenn.	

†Silvery

Jackson county, O., base: 6-6.50 per cent $25.50; 6.51-7—$2 7-7.50—$26.50; 7.51-8—$27.00; 8-8.50—$27.50; 8.51-9—$2 9-9.50—$28.50; Buffalo, $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base; Prices are the same as for silve plus $1 a ton.

†The lower all-rail delivered price from Jackson, O., or Bu is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicon, 2 to $1 per ton add. Each unit over 3%, add $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$60.80

First Quality

Pa., Ill., Md., Mo., Ky.	47.50
Alabama, Georgia	47.50
New Jersey	52.50

Second Quality

Pa., Ill., Ky., Md., Mo.	42.75
Georgia, Alabama	34.20
New Jersey	49.00

Ohio

First quality	39.90
Intermediate	36.10
Second quality	31.35

Malleable Bung Brick

All bases	$56.05

Silica Brick

Pennsylvania	$40.00
Joliet, E. Chicago	49.00
Birmingham, Ala.	40.00

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$28.00
Wire cut	$26.00

Magnesite

Imported dead - burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases (bags)	$4
Do. domestic	4
Do., f.o.b. Chewelah, Wash., net ton, bulk	2
net ton, bags	2
Quickset magnesite grains, f.o.b. Chewelah, Wash., net ton, bulk	2

Basic Brick

Net ton, f.o.b. Baltimore, mouth Meeting, Chester,

Chrome brick	$4
Chem. bonded chrome	4
Magnesite brick	6
Chem. bonded magnesite	5

Fluorspar, 85-5

Washed gravel, duty paid, tide, net ton	$2
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail $17, barge	$1
No. 2 lump	1

Ferroalloy Prices

Ferromanganese, 78-82%, tidewater, duty pd. $80.00
Do., del. Pittsburgh 85.33

Spiegeleisen, 19-21% dom. Palmerton, Pa., spot 28.00
Do., 26-28%, Palmerton 33.00

Ferrosilicon, 50% freight allowed, c.l. 69.50
Do., ton lot 80.50
Do., 75 per cent 126.00
Spot, $5 a ton higher.

Silicoman, 2½ carbon 88.00
2% carbon, 93.00; 1%, 103.00
Contract ton price $11 higher; spot $5 over contract.

Ferrotungsten, stand., lb. con. del. cars 1.65-1.70

Ferrovanadium, 35 to 40%, lb., cont. 2.70-2.80-2.90

Ferrophosphorus, gr. ton, c.l., 17-18% Rockdale, Tenn., basis, 18%, $3 unitage, 58.50; electrolytic, per ton, c. l., 23-26% f.o.b. Monsanto, Tenn., 24% $3 unitage 75.00

Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb., contained cr., del. carlots 10.50c
Do., ton lots 11.25c
Do., less-ton lots 11.50c

67-72% carloads, 2% carbon, per lb. contained

chrome	16.50c
Do., ton lots	17.25c
Do., less-ton lots	17.75c

	Carloads	Ton lots	Less ton
2% carb.	16.50c	17.25c	17.50c
1% carb.	17.50c	18.25c	18.50c
0.10% carb.	18.50c	19.25c	19.50c
0.20% carb.	19.50c	20.25c	20.50c

Spot ¼c higher

Ferromolybdenum, 55-65% molyb. cont., f.o.b. mill, lb. 0.95

Calcium molybdate, lb. molyb. cont., f.o.b. mill 0.80

Ferrotitanium, 40-45%, lb., con. ti., f.o.b. Niagara Falls, ton lots $1.23
Do., less-ton lots 1.25
20-25% carbon, 0.10 max., ton lots, lb. 1.35
Do, less-ton lots 1.40
Spot 5c higher

Ferrocolumbium, 50-60%, contract, lb. con. col., f.o.b. Niagara Falls $2.25
Do, less-ton lots 2.30
Spot is 10c higher

Technical molybdenum trioxide, 53 to 60% molybdenum, lb. molyb. cont., f.o.b. mill 0.80

Ferro-carbon-titanium, 15-18%, ti., 6-8% carb., carlots, contr., net ton $142.50
Do, spot 145.00
Do, contract, ton lots 145.00
Do, spot, ton lots 150.00

15-18% ti., 3-5% carbon, carlots, contr., net ton 157.50
Do, spot 160.00
Do, contract, ton lots. 160.00
Do, spot, ton lots 165.00

Alsifer, contract carlots, f.o.b. Niagara Falls, lb. 7.50c
Do, ton lots 8.00c
Do, less-ton lots 8.50c
Spot ½c lb. higher

Chromium Briquets, contract, any quantity, freight allowed, lb. 7.25c
Do, spot carlots, bulk 7.50c
Do, ton lots 8.00c
Do., less-ton lots 8.25c

Tungsten Metal Powder, according to grade, spot shipment, 200-lb. drum lots, lb. $2.05
Do, smaller lots 2.15

Vanadium Pentoxide, contract, lb. contained $1.10
Do, spot 1.15

Chromium Metal, 98% cr., 0.50 carbon max., contract, lb. con. chrome 80.00c
Do, spot 85.00c
88% chrome, contract 79.00c
Do, spot 84.00c

Silicon Metal, 1% iron, contract, carlots, 2 x ⅛-in., lb. 14.
Do, 2% 12.
Spot ¼c higher

Silicon Briquets, contract carloads freight allowed, ton $69
Carload, spot 74
Less-ton lots, lb. 3.

Manganese Briquets, contract carloads, bulk freight allowed, lb. 4.
Ton lots 5.
Less-ton lots 5.
Spot ¼c higher

Zirconium Alloy, 12-15%, contract, carloads, gross ton $97
Do, spot 102

34-40%, contract, carloads, lb., alloy 14.
Do, ton lots 15.
Do, less-ton lots 16.
Spot ¼c higher

Molybdenum Powder, 99%, f.o.b. York, Pa. 200-lb. kegs, lb. $2.
Do, 100-200 lb. lots 2.
Do. under 100-lb. lots 3.

Molybdenum Oxide Briquets, 48-52% molybdenum, per pound contained, f.o.b. producers' plant 80.

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials

	Soft Bars	Bands	Hoops	Plates ¼-in. & Over	Structural Shapes	Floor Plates	Sheets: Hot Rolled	Sheets: Cold Rolled	Sheets: Galv. No. 24
[illegible]	3.98	4.21	5.21	3.85	3.85	5.66	3.86	4.93	4.61
[illegible] York (Metropolitan)	3.94	4.11	4.11	3.76	3.75	5.56	3.40	4.60	4.50
[illegible] delphia	3.60	3.60	4.10	3.40	3.40	5.00	3.40	....	4.33
[illegible] more	3.80	3.95	4.35	3.65	3.65	5.00	3.70	5.05	4.30
[illegible] olk, Va.	4.00	4.15	4.55	3.85	3.85	5.20	3.90	4.80	5.40
[illegible] lo	3.60	3.97	3.97	3.77	3.55	5.40	3.50	4.55	4.40
[illegible] burgh	3.60	3.75	3.75	3.55	3.55	5.15	3.50	4.60	4.50
[illegible] land	3.50	3.65	3.65	3.55	3.73	5.33	3.50	4.70	4.62
[illegible] it	3.43	3.58	3.83	3.75	3.80	5.42	3.58	4.65	4.74
[illegible] innati	3.85	3.82	3.82	3.80	3.83	5.43	3.57	....	4.57
[illegible] ago	3.60	3.75	3.75	3.55	3.55	5.15	3.50	4.45	4.50
[illegible] eapolis	3.85	4.00	4.00	3.80	3.80	5.40	3.75	5.10	4.75
[illegible] laukee	3.73	3.88	3.88	3.68	3.68	5.28	3.63	4.58	4.63
[illegible] Louis	3.87	4.02	4.02	3.82	3.82	5.42	3.77	4.72	4.77
[illegible] as City	4.15	4.30	4.30	4.10	4.10	5.70	4.10	....	4.75
[illegible] phis	4.00	4.15	4.15	3.95	3.95	5.71	3.90	....	5.25
[illegible] tanooga	3.90	4.05	4.05	3.85	3.85	5.80	3.80	....	4.40
[illegible] a, Okla.	4.64	4.79	4.79	4.59	4.59	6.19	4.54	....	5.54
[illegible] ingham, Ala.	3.50	3.65	3.65	3.45	3.45	5.83	3.40	....	4.75
[illegible] Orleans	3.85	4.65	4.65	3.80	3.80	5.75	4.10	....	4.60
[illegible] nton, Tex.	3.50	5.85	6.25	4.05	4.05	5.65	3.95	....	5.25
[illegible] tle	4.30	4.50	5.85	4.05	4.15	5.90	3.95	....	5.25
[illegible] land, Oreg.	4.00	4.40	6.10	4.00	4.00	5.50	3.95	6.50	4.75
[illegible] Angeles	4.00	4.50	6.35	4.00	4.00	6.20	4.20	6.30	4.75
[illegible] Francisco	3.65	4.05	6.00	3.60	3.60	5.20	3.60	6.40	5.15

	Cold Rolled Strip	Cold Finished Bars	SAE Hot-rolled Bars (Unannealed): 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series	SAE Cold Drawn Bars: 2300	3100
[illegible] on	3.61	4.18	4.28	7.65	6.25	6.00	8.05	8.73	7.33
[illegible] York	3.66	4.14	4.14	7.50	6.10	5.85	....	8.69	7.29
[illegible] adelphia	3.66	4.11	3.85	7.46	6.06	5.81	8.71	....	....
[illegible] more	....	4.10	3.95	....	....	....	....	....	....
[illegible] olk, Va.	....	4.20	....	....	....	....	....	....	....
[illegible] alo	3.57	3.80	3.80	7.25	5.85	5.60	7.65	8.25	6.85
[illegible] burgh	3.35	3.70	3.80	7.35	5.95	5.70	7.75	8.35	6.95
[illegible] eland	3.35	3.80	3.70	7.45	6.05	6.05	7.85	8.25	6.85
[illegible] oit	3.55	3.85	3.58	7.57	6.17	5.92	7.39	8.55	7.15
[illegible] innati	3.60	4.05	3.90	7.59	6.19	5.94	8.99	8.60	7.20
[illegible] ago	3.65	3.80	3.80	7.25	5.85	5.60	7.65	8.25	6.85
[illegible] eapolis	....	4.39	4.00	7.60	6.20	8.79	9.34	8.94	7.54
[illegible] aukee	....	3.93	3.93	7.48	6.08	5.83	7.88	8.48	7.08
[illegible] Louis	3.76	4.32	4.07	7.62	6.22	5.97	8.02	8.62	7.22
[illegible] sas City	4.46	4.60	....	....	....	....	....	....	....
[illegible] phis	....	4.61	....	....	....	....	....	....	....
[illegible] tanooga	....	4.44	....	....	....	....	....	....	....
[illegible] a, Okla	....	4.84	....	....	....	....	....	....	....
[illegible] ingham, Ala.	....	4.73	....	....	....	....	....	....	....
[illegible] Orleans	5.00	5.10	....	....	....	....	....	....	....
[illegible] tle	....	5.60	5.65	....	7.80	7.65	8.45	....	....
[illegible] land, Oreg.	....	5.60	6.10	9.00	8.00	7.85	8.70	....	....
[illegible] Angeles	4.45	6.50	4.65	9.40	8.55	8.40	9.05	10.40	9.55
[illegible] Francisco	*9.30	6.55	5.20	9.65	8.80	8.65	9.30	10.65	9.80

* Based on minimum quantity.

CURRENT IRON AND STEEL PRICES OF EUROPE

Dollars at Rates of Exchange, March 30

[illegible]port Prices f. o. b. Port of Dispatch—

By Cable or Radio

	British gross tons U. K. ports £ s d	Quoted in dollars at current value	Continental Channe or North Sea ports, gross tons **Quoted in gold pounds sterling £ s d
[illegible] ndry, 2.50-3.00 Si...	$23.45 5 0 0	$17.25	2 0 6
[illegible] c bessemer	.....	15.98	1 17 6
[illegible] matite, Phos. .03-.05	26.97 5 15 0*	.....	.....
[illegible] ts	$34.59 7 7 6	$38.34	4 10 0
[illegible] e rods, No. 5 gage..	53.35 11 7 6	42.60	5 0 0
[illegible] dard rails	$44.56 9 10 0	$48.99	5 15 0
[illegible] chant bars	2.30c 11 0 0	1.85c to 1.95c	4 15 0 to 5 0 0
[illegible] ctural shapes	2.09c 10 0 0	1.85c to 1.90c	4 15 0 to 4 17 6
[illegible] es, ¼ in. or 5 mm.	2.29c 10 18 9	2.10c to 2.34c	5 7 6 to 6 0 0
[illegible] ets, black, 24 gage & 0.5 mm	2.72c 13 0 0	2.93c	7 10 0*
[illegible] ets, gal., 24 ga., corr.	3.29c 15 15 0	3.61c	9 5 0
[illegible] de and strips	2.77c 13 5 0	1.95c	5 0 0
[illegible] n wire, base	4.08c 19 10 0	2.39c to 2.83c	6 2 6 to 7 5 0
[illegible] vanized wire, base	4.86c 23 5 0	3.07c to 3.17c	7 17 6 to 8 2 6
[illegible] e nails, base	.....	2.73c to 2.93c	7 0 0 to 7 10 0
[illegible] plate, box 108 lbs.	$ 4.73 1 0 3	.....	.....

[illegible]ritish ferromanganese $80.00 delivered Atlantic seaboard duty-paid.

Domestic Prices at Works or Furnace—

Last Reported

	£ s d		French Francs		Belgian Francs		Reich Mark
Fdy. pig iron, Si. 2.5.	$23.22	4 19 0(a)	$17.44	620.50	$15.17	450	$25.28	63
Basic bess. pig iron..	21.69	4 12 6(a)	.....	...	.....	...	27.88(b)	69.50
Furnace coke.....	5.39	1 4 2	5.96	225	7.25	215	7.62	19
Billets.....	34.59	7 7 6	25.04	945	28.98	860	38.72	96.50
Standard rails.....	1.99c	9 10 0	1.56c	1,300	2.06c	1,375	2.38c	132
Merchant bars.....	2.42c	11 12 0††	1.44c	1,202	1.65c	1,100	1.98c	110
Structural shapes...	2.17c	10 8 0††	1.41c	1,173	1.65c	1,100	1.93c	107
Plates, †¼-in. or 5 mm.....	2.29c	10 19 3††	1.82c	1,515	2.06c	1,375	2.29c	127
Sheets, black.....	3.08c	14 15 0§	2.17c	1,805‡	2.36c	1,575‡	2.59c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm....	3.61c	17 5 0	3.12c	2,600	4.13c	2,750	6.66c	370
Plain wire.....	4.08c	19 10 0	1.92c	1,600	2.48c	1,650	3.11c	173
Bands and strips...	2.58c	12 7 0††	1.71c	1,340	1.95c	1,300	2.29c	127

*Basic. †British ship-plates. Continental, bridge plates. $24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continent usually for basic-bessemer steel. (a) del. Middlesbrough. 5s rebate to approved customers. (b) hematite. °Close annealed. ††Rebate of 15s on certain conditions.

**Gold pound sterling carries a premium of 75 per cent over paper sterling.

IRON AND STEEL SCRAP PRICES

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated; †indicates brokers prices

HEAVY MELTING STEEL

Birmingham, No. 1.	†12.00
Bos. dock No. 1 exp.	13.75-14.00
New Eng. del. No. 1	14.00
Buffalo, No. 1	13.75-14.25
Buffalo, No. 2	12.00-12.50
Chicago, No. 1	14.00-14.50
Chicago, auto, no alloy	12.50-13.00
Chicago, No. 2 auto	11.50-12.00
Cincinnati, dealers	12.00-12.50
Cleveland, No. 1	14.50-15.00
Cleveland, No. 2	13.50-14.00
Detroit, No. 1	10.50-11.00
Detroit, No. 2	9.50-10.00
Detroit (industrial)	11.00-11.50
Eastern Pa., No. 1	15.50-16.00
Eastern Pa., No. 2	13.50-14.00
Federal, Ill.	11.75-12.25
Granite City, R. R.	12.00-12.50
Granite City, No. 2	11.00-11.50
Los Angeles, No. 1	12.50-13.50
Los Angeles, No. 2	11.00-11.50
N. Y. dock No. 1 exp.	12.00-12.50
Pitts., No. 1 (R. R.)	16.50-17.00
Pittsburgh, No. 1	15.50-16.00
Pittsburgh, No. 2	14.50-15.00
St. Louis, R. R.	12.25-12.75
St. Louis, No. 2	11.00-11.50
San Francisco, No. 1	12.00
Seattle, No. 1	12.00
Toronto, dlrs. No. 1.	9.50- 9.75
Valleys, No. 1	15.00-15.50

COMPRESSED SHEETS

Buffalo	12.00-12.50
Chicago, factory	13.00-13.50
Chicago, dealer	12.00-12.50
Cincinnati, del.	11.25-11.75
Cleveland	14.50-15.00
Detroit	12.00-12.50
E. Pa., new mat.	15.50
E. Pa., old mat.	11.00-11.50
Los Angeles	12.50-13.00
Pittsburgh	15.50-16.00
St. Louis	10.00-10.50
Valleys	14.50-15.00

BUNDLED SHEETS

Buffalo, No. 1	12.00-12.50
Buffalo, No. 2	11.00-11.50
Cleveland	11.00-11.50
Los Angeles	14.00
Pittsburgh	14.75-15.25
St. Louis	7.50- 8.00
Toronto, dealers	3.50

SHEET CLIPPINGS, LOOSE

Chicago	10.50-11.00
Cincinnati, dealers	7.25- 7.75
Detroit	8.75- 9.25
†Los Angeles	3.75- 4.00
St. Louis	7.00- 7.50

BUSHELING

Buffalo, No. 1	12.00-12.50
Chicago, No. 1	12.50-13.00
Cincin., No. 1, deal.	8.25- 8.75
Cincinnati, No. 2	3.75- 4.25
Cleveland, No. 2	8.50- 9.00
Detroit, No. 1, new	10.50-11.00
Valleys, new, No. 1.	14.25-14.75
Toronto, dealers	4.00- 4.25

MACHINE TURNINGS (Long)

Birmingham	†4.50- 5.00
Buffalo	7.00- 7.50
Chicago	6.75- 7.25
Cincinnati, dealers	5.00- 5.50
Cleveland	7.50- 8.00
Detroit	6.00- 6.50
Eastern Pa.	9.50-10.00
Los Angeles	4.50- 5.00
New York	†3.50- 4.00
Pittsburgh	9.75-10.25
St. Louis	3.00- 4.00
Toronto, dealers	4.00- 4.50
Valleys	9.50-10.00

SHOVELING TURNINGS

Buffalo	7.25- 8.00
Cleveland	8.00- 8.50
Chicago	8.50- 9.00
Detroit	6.75- 7.25
Pitts., alloy-free	11.25-11.75

BORINGS AND TURNINGS

For Blast Furnace Use

Boston district	2.00
Buffalo	7.00- 7.25
Cincinnati, dealers	3.50- 4.00
Cleveland	8.50- 9.00
Eastern Pa.	6.50- 7.00
Detroit	6.25- 6.75
New York	†2.50- 3.00
Pittsburgh	8.75- 9.00
Toronto, dealers	5.00- 5.50

AXLE TURNINGS

Boston district	†7.50
Buffalo	9.50-10.00
Chicago, elec. fur.	14.00-14.50
East. Pa., elec. fur.	13.50
St. Louis	9.50-10.00
Toronto	4.25- 4.50

CAST IRON BORINGS

Birmingham	†6.00- 6.50
Boston dist. chem.	†6.00- 6.25
Buffalo	7.50- 8.00
Chicago	6.00- 6.50
Cincinnati, dealers	3.50- 4.00
Cleveland	8.50- 9.00
Detroit	6.25- 6.75
E. Pa., chemical	10.00-11.00
New York	†3.50- 4.00
St. Louis	2.50- 3.00
Toronto, dealers	4.00- 4.25

RAILROAD SPECIALTIES

Chicago	16.00-16.50

ANGLE BARS—STEEL

Chicago	16.00-16.50
St. Louis	13.75-14.25

SPRINGS

Buffalo	16.00-16.50
Chicago, coil	17.00-17.50
Chicago, leaf	15.75-16.25
Eastern Pa.	17.50-18.00
Pittsburgh	18.00-18.50
St. Louis	15.00-15.50

STEEL RAILS, SHORT

Birmingham	†12.00-12.50
Buffalo	17.00-17.50
Chicago (3 ft.)	16.50-17.00
Chicago (2 ft.)	17.00-17.50
Cincinnati, dealers	17.00-17.50
Detroit	17.00-17.50
Los Angeles	15.00-15.50
Pitts., 3 ft. and less	18.25-18.75
St. Louis, 2 ft. & less	16.25-16.75

STEEL RAILS, SCRAP

Boston district	†13.50-14.00
Buffalo	16.00-16.50
Chicago	14.00-14.50
Cleveland	17.00-17.50
Pittsburgh	17.00-17.50
St. Louis	13.75-14.25
Seattle	16.00

FROGS, SWITCHES

Chicago	14.00-14.50
St. Louis, cut	13.75-14.00

ARCH BARS, TRANSOMS

St. Louis	14.00-14.50

PIPE AND FLUES

Chicago, net	9.00- 9.50
Cincinnati, dealers	7.25- 7.75

RAILROAD GRATE BARS

Buffalo	10.00-10.50
Chicago, net	8.50- 9.00
Cincinnati, dealers	7.25- 7.75
Eastern Pa.	13.50
New York	†8.50- 9.00
St. Louis	9.00- 9.50

RAILROAD WROUGHT

Birmingham	†11.00-11.50
Boston district	†9.50-10.00
Eastern Pa., No. 1	16.00-16.50
St. Louis, No. 1	10.75-11.25
St. Louis, No. 2	10.00-10.25

FORGE FLASHINGS

Boston district	†8.50
Buffalo	12.00-12.50
Cleveland	12.00-12.50
Detroit	10.50-11.00
Los Angeles	9.00
Pittsburgh	14.50-15.00

FORGE SCRAP

Boston district	†6.50
Chicago, heavy	16.50-17.00

LOW PHOSPHORUS

Buffalo, crops	16.50-17.00
Cleveland, crops	18.00-18.50
Eastern Pa., crops	17.00-17.50
Pitts., billet, bloom, slab crops	19.00-19.50

LOW PHOS. PUNCHINGS

Buffalo	15.50-16.00
Chicago	16.50-17.00
Eastern Pa., crops	17.50-18.00
Pittsburgh	18.00-18.50
Seattle	15.00

RAILS FOR ROLLING

5 feet and over

Birmingham	†14.00-15.00
Boston	15.00-15.50
Chicago	17.00-17.50
New York	†14.50-15.00
Eastern Pa.	17.00-17.50
St. Louis	16.50-17.00

STEEL CAR AXLES

Birmingham	†15.00-16.00
Buffalo	16.50-17.00
Boston district	†16.00-16.50
Chicago, net	18.00-18.50
Eastern Pa.	21.00-21.50
St. Louis	18.00-18.50

LOCOMOTIVE TIRES

Chicago (cut)	16.00-16.50
St. Louis, No. 1	13.50-14.00

SHAFTING

Boston district	†15.25-15.75
New York	†15.50
Eastern Pa.	20.50
St. Louis, 1¼-3¾"	17.50

CAR WHEELS

Birmingham	†13.50
Boston dist., iron	
Buffalo, steel	16.50
Chicago, iron	13.50
Chicago, rolled steel	15.50
Cincin., iron, deal.	13.50
Eastern Pa., iron	16.50
Eastern Pa., steel	17.50
Pittsburgh, iron	15.00
Pittsburgh, steel	18.00
St. Louis, iron	14.50
St. Louis, steel	14.50

NO. 1 CAST SCRAP

Birmingham	†13.00
Boston, No. 1 mach.	†10.50
N. Eng. del. No. 2	12.00
N. Eng. del. textile	12.50
Buffalo, cupola	14.50
Buffalo, mach.	15.50
Chicago, agri. net	10.50
Chicago, auto net	13.00
Chicago, rail'd net	11.50
Chicago, mach. net	12.00
Cincin., mach. deal.	14.00
Cleveland, mach.	17.00
Eastern Pa., cupola	16.50
E. Pa., mixed yard	
Los Angeles, net	13.50
Pittsburgh, cupola	15.25
San Francisco, del.	13.50
Seattle	12.00
St. Louis, cupola	12.00
St. Louis, agri. mach.	14.00
St. L., No. 1 mach.	14.50
Toronto, No. 1, mach., net	12.00

HEAVY CAST

Boston dist. break.	
New England, del.	12.50
Buffalo, break.	11.00
Cleveland, break, net	13.00
Detroit, auto net	13.00
Detroit, break.	10.50
Eastern Pa.	15.00
Los Ang., auto, net	13.00
New York, break.	†10.50
Pittsburgh, break.	13.25

STOVE PLATE

Birmingham	†7.50
Boston district	†8.00
Buffalo	13.00
Chicago, net	8.00
Cincinnati, dealers	7.25
Detroit, net	8.00
Eastern Pa.	
New York, fdy.	†10.00
St. Louis	7.50
Toronto dealers, net	7.50

MALLEABLE

Birmingham, R. R.	†10.50
New England, del.	14.50
Buffalo	13.50
Chicago, R. R.	15.50
Cincin., agri. deal.	12.50
Cleveland, rail	15.50
Eastern Pa., R. R.	15.00
Los Angeles	17.50
Pittsburgh, rail	15.00
St. Louis, R. R.	12.25

Iron Ore

Lake Superior Ore

Gross ton, 51½%

Lower Lake Ports

Old range bessemer	$5.25
Mesabi nonbes.	4.95
High phosphorus	4.85
Mesabi bessemer	5.10
Old range nonbes.	5.10

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56.63% con.	9.00-9.25
Cop.-free low phos. 58-60%	nominal

Foreign Ore

Cents per unit, c.i.f. Atlantic

Foreign manganiferous ore, 45.55% iron, 6-10% man. nom.	12.00
No. Afr. low phos.	12.00
Swedish low phos.	12.00
Spanish No. Africa basic, 50 to 60% nom.	9.00- 9.50
Tungsten. sh. ton. unit, duty pd. nom.	20.00
N. F., fdy., 55%	7.00
Chrome ore, 48% gross ton, c.i.f.	$23.00-24.00
Molybdenum ores sulphide, per lb. molybdenum contained, f.o.b. mill	

Manganese Ore

Prices not including duty, per unit cargo lots.

Caucasian, 50-52% nom.	
So. African, 50-52% nom.	
Indian, 49-50%	27.00

heets, Strip

and Strip Prices, Pages 70 and 71

sburgh—Sheets and strip are with production off slightly. g mostly is for fill-in lots for r users, although miscellane- lemand is a little more active. notive orders are light, with inquiries also absent. March s generally were more numer- out smaller individually, leav- he month's tonnage no higher in February. Sheet produc- s around 55 per cent, with gal- ed output moderately above Hot strip output is near 35 per and cold strip about 40.

veland—Sheet demand is fairly y, but March business was be- expectations, recording little ge from February. Needs of ellaneous users are fairly y and in some cases have in- sed slightly, but automotive ng still lags. Manufacture of ehold equipment continues ac- at a number of plants, although ing off in operations of some ests is noted.

icago—A slight decline is noted ookings of sheets and strip. eral miscellaneous ordering has ted somewhat, while some mills a tapering of automotive de- d. Agricultural equipment re- ements remain consistent.

ston—Merrill & Usher, Worces- Mass., jobbers, are low on 750 of hot-rolled pickled and an- ed license tag stock for Massa- etts at 3.709c, delivered, ship- ts to start July 1. Second low er was by Carnegie-Illinois Steel ., 3.71c, New Hampshire opens week on close to 100 tons of the e material. Sheet buying is un- ged and slow. There is no sus- ed improvement in cold strip me, although demand is well di- ified as to specifications. Prac- ly all orders are for prompt de- y. Rerollers as a rule are not ating better than 50 to 60 per .

ew York—March business was w expectations, barely equal- that of February. Some sellers rt decreases of as much as 20 cent. This showing is attrib- in part to slack demand from ers and to lighter orders from e and refrigerator manufactur- The latter are working against ages bought several weeks ago, some fill-in buying is expected r. Little anticipatory business appeared from consumers who be at a disadvantage under new ntity differentials, now effective. arrow cold strip buying is ty, in small lots for immediate

THEY STARED AT A BLINKING GIRL

and found a new key to human comfort

These nine photos, taken with a super-speed camera, show progressive stages in the course of one blink.

OF all the strange tests and experiments carried on at the General Electric Lighting Research Laboratory at Nela Park, Cleveland, few have turned out to be of greater importance to industrial plants than the "Blink Test."

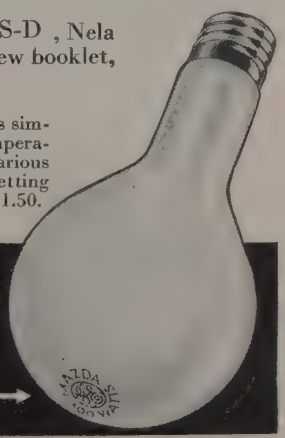
The test consists merely of recording the number of times a person blinks under various kinds of light. But it shows that nearly all of the hidden discomforts caused by poor seeing conditions are revealed by the "rate of blink!"

Thanks to lighting research of this type, the kind and amounts of light needed for performing various industrial processes efficiently and with a minimum of eyestrain, can easily be determined. With a G-E Light Meter, you and your shop foreman and plant superintendents can measure the light accurately.

Important to the success of any relighting program is the use of good lamp bulbs. Thrifty industrial purchasers buy Edison MAZDA lamps because these lamps *stay brighter longer* . . . provide more light at no additional cost for current. Use the new, brighter 1939 Edison MAZDA lamps in your plant.

Write General Electric Company, Dept. 166- S-D , Nela Park, Cleveland, Ohio, for a free copy of the new booklet, "Lighting for Production in the Factory."

A G-E Light Meter measures light as simply as a thermometer measures temperature. You can tell whether the various departments in your plant are getting enough light for safe seeing. Costs $11.50.



EDISON MAZDA LAMPS

GENERAL ELECTRIC

They stay brighter longer →

delivery with larger consuming industries placing orders for stock about in line with current operations, which in some instances are slightly lower. Buying by automobile partsmakers has slumped and household appliance manufacturers are buying sparingly. Strip prices, however, appear steadier than for some time.

Philadelphia — Automobile body and frame production is steady, but it is indicated output of 1939 models will be continued for only about eight more weeks. This is also substantiated by reports from makers of miscellaneous parts. Makers of truck cabs and fenders are fairly busy. No test is expected for a month or two of the new price setup eliminating functional allowances to jobbers on galvanized sheets since coverage was heavy prior to the April 1 deadline.

Buffalo—Demand for sheets and strip is holding steady and is considered only fair. Automotive releases still are small.

Birmingham, Ala.—Sheets show little inclination to drop from the high rate of production evident over the past few months. Sheet production continues to lea field, while strip, consisting n of cotton ties in this section, ing produced as a fill-in and l large quantities.

BETTER CASTINGS AT LESS COST PER TON

... with SHEPARD-NILES CUPOLA CHARGING HOISTS

● Each charge is lowered in place, not dropped. Uniformly layered charges insure more even distribution of heat. Expensive charging floors are eliminated. Cupolas are charged faster and with fewer men—LESS cost per ton.

A COMPLETE LINE OF CRANES & HOISTS

SHEPARD NILES CRANE & HOIST CORP.

358 SCHUYLER AVENUE...MONTOUR FALLS, N.Y.

Plates

Plate Prices, Page 70

Cleveland—Repair work on boats is more active, althoug far this has been without effe plate business. Miscellaneou mand is fairly steady in small while railroad buying is quie substantial plate tonnage is ing for pipe to be bid this n for the Toledo, O., waterwork provement.

Chicago—Demand for steel shows little change. Tank con tion is prominent in plate r Railroad car building, which been looked to as an incre source of demand, has not be active.

Boston—Plate demand holds recent rate with some slight in specified work pending. A include a 100-ton standpipe. storage tank work is missin though several large projects under consideration. Shipyar leases are steady. Miscella buying, however, is generall small lots.

New York—Plate demand has tinued quiet, following the r award of 7500 tons for a secti the Delaware water aqueduct. cifications for railroad equip placed lately still are pending. company specifications are light withstanding the substantial ery construction program co plated by the industry. Tank boiler tonnage remains sp American Locomotive Co., York, is placing more than 1000 of plates for locomotives for Union Pacific.

Philadelphia—Ship plate rele are none too active, but a bulg specifications from both the Che Pa., and Virginia yards is seer April. Little additional rail buying is noted. The local loc tive works is reported figurin export business. Demand from West and Gulf coasts is comp tively quiet, with an inquiry the former for 500 tons of 12- pipe the only outstanding inq Some plate makers report mi laneous business improving, in ing movement out of wareh stocks.

Newport News Shipbuilding Dry Dock Co., Newport News, has been awarded an airplane rier by the navy, at $31,800,000 which it was the only bidder.

ningham, Ala.—Plates are in what less but satisfactory vol- although there is expectation ick-up when specifications are eted for projects now in the g.

ttle—Shops report only fair e of small jobs, for boilers, and stacks, total below ex- d seasonal levels. No large cts involving plates are an- ced. Lake Union Dry Dock & ine Works, Seattle, is low at 0 for construction of a 163 shallow draft, stern wheel er for U. S. engineer, Seattle, ving about 200 tons.

n Francisco—Youngstown Sheet be Co. is apparently low bid- n 500 tons of plates for the u of reclamation under invita- 3,119-A-1, for delivery at Sacra- o, Calif. The Lake Union Dry- & Machine Works submitted w bid to the United States en- r office, Seattle, Wash., at $93,- for a snag boat 163 feet long, ring 200 tons of plates and es. So far this year 14,792 tons been awarded as compared 12,218 tons for the correspond- eriod in 1938.

e Contracts Placed

tons, 72-inch steel line pipe for erworks improvement, Toledo, O., Bethlehem Steel Co., Bethlehem, Pa.; s April 12 on 15,000 tons addi- al of 78-inch pipe.

ons, 20 and 24-inch steel pipe, rietta, O., and Paducah, Ill., de- ry, United States engineer, Louis- e, Ky., to American Rolling Mill Middletown, O.

ons, four fermenter tanks, Jos. E. gram & Son Inc., Louisville, Ky., Stacey Mfg. Co., Cincinnati.

tons, large diameter steel pipe, ecting mains, McMillan filtered er reservoir, Washington, to Na- al Tube Co., Pittsburgh; Couse & nders, Detroit, general contractors.

te Contracts Pending

ons, bureau of reclamation, invita- n 33,119-A-1, Sacramento, Calif.; ungstown Sheet & Tube Co., Youngs- n, O., low.

ons, for Sohio bulk plant at Cincin- i; also 150 tons structural shapes; s in.

ons, including shapes, 163-foot stern eel steamer for United States engi- r, Seattle; Lake Union Dry Dock & chine Works, Seattle, low.

ated tonnage, pipe and fittings for lee dam; Grimes Pipe & Supply Co., iver, low.

ated tonnage, derrick hull for United tes engineer, Bonneville dam; Com- rcial Iron Works, Portland, Oreg., v.

el Imports Light

iladelphia — Imports received ng the week ending March 25 ded 231 tons of structural es, 28 tons of steel bands and 22 tons of steel bars from Belgium, as well as 42 tons of steel tubes, 36 tons of wire rods and 6 tons of steel bars from Sweden.

Bars

Bar Prices, Page 70

Cleveland—Bar sales still are retarded by absence of heavier requirements of automotive interests. As a result, business lately has held closely to the volume a month ago. Demand from some miscellaneous users has tended upward the past several weeks, but gains are spotty and March shipments for most producers showed only a small gain over February.

New York—Plain carbon bar business continues small, with jobbers specifying lightly and railroad demand still limited. Bolt and nut manufacturers are taking material sparingly. Buying of cold drawn and alloy bars is fairly active, with sizable specifications coming from airplane, roller bearing, marine hardware and machinery interests.

After all, steel making at its best is a precision art in which the most important factor is man power. There's a knack to steel making that only the years can bring and only long experience sharpen. Here at Andrews we pride ourselves on our men and their superior steel making abilities. Every slab, bar, bloom or billet that leaves this plant bears the unmistakable imprint of each man's skill and craftsmanship. To select Andrews for your requirements is to make sure of two major essentials: (1) iron and steel products of unsurpassed quality, and (2) a wholly dependable source of supply.

In Carbon and Alloy Steels: Blooms • Forging Billets • Rerolling Billets • Slabs • Universal Mill Plates • Sheet Bars

THE ANDREWS STEEL CO.
NEWPORT, KENTUCKY
DIVISIONS
THE NEWPORT ROLLING MILL COMPANY
THE GLOBE IRON ROOFING & CORRUGATING CO.

Tendency in demand from the latter group has been upward steadily for a number of weeks.

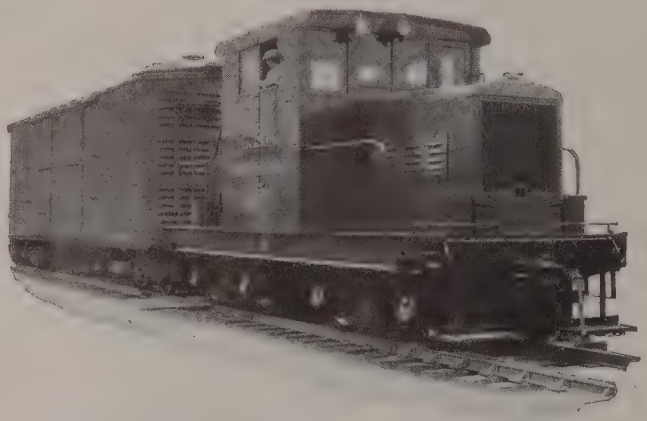
Boston—Demand for commercial steel bars continues to drag with alloy and forging material making relatively the best showing. Few large orders are coming from jobbers, through whom a substantial volume of bar tonnage is distributed in this territory. Machine tool builders are buying steadily, generally through secondary sellers.

Chicago—Demand has leveled off, following a recent letdown. Cold-drawers have reduced requirements in some instances, and automotive ordering has lagged. Needs of farm equipment interests are sustained, however, March orders were slightly below February tonnage, although shipments were heavier, thereby curtailing backlogs. The April outlook is uncertain.

Birmingham, Ala.—Bar business is slowing down somewhat although still on a satisfactory basis. Concrete reinforcing bars are in consistent demand, and some business is materializing from manufacturers of agricultural implements.

Buffalo — Bar orders are off slightly, but this is regarded a a temporary interruption. R production results principally lighter automotive and shape An increase in the latter in th future is thought assured.

ATLAS GAS-ELECTRIC LOCOMOTIVES



45 Ton Locomotive especially suitable for economical interplant switching service.

OTHER ATLAS PRODUCTS

Gas-Electric and Diesel-Electric Locomotives . . . Electric Transfer Cars for Blast Furnaces and Steel Plants . . . Stockhouse Scale Cars for Blast Furnaces . . . Concentrate and Calcine Cars for Copper Refineries . . . Automatic and Remote Controlled Electric Cars . . . Pushers, Levellers and Door Extractors . . . Coal Charging Lorries, Coke Guides and Clay Carriers . . . Atlas Patented Coke Quenching Cars for By-Product Coke Ovens . . . Atlas Patented Indicating and Recording Scales . . . Special Cars and Electrically Operated Cars for every conceivable Purpose.

THE ATLAS CAR & MFG. CO.

Engineers . . . Manufacturers

CLEVELAND, OHIO

Pipe

Pipe Prices, Page 71

Pittsburgh—Buying of me pipe is below expectations, shipments being little ch from February except as sult of the longer month tivity in oil country goods appointing. Mechanical tubi moving steadily, principal automotive plants. Demand where is spotty and generall changed. Business in boiler and other pressure tubing is er than a month ago, althoug roads indicate possibility of h needs later in the year.

Cleveland—Steel pipe ship to distributors showed little c during March, although for producers the longer month vides a small increase over ary. The building industry most promise for heavier con tion the next few months. large pipe lines are being disc but these are not yet near th ding stage. Jobber stocks of ard pipe approximate those on a year ago.

New York—Small-lot inquir cast pipe tends upward, alt buying is slow. Yonkers, N. expected to ask bids short about 800 tons, 12 to 24-inch, contractor is purchasing 300 mostly 8-inch for Westchester ty. Utilities in the East are placing pipe orders in slightl ter volume.

Birmingham, Ala. — Pipe are producing at a pace some in excess of fourth quarter have prospects for continued stantial tonnage, a considerable tion of it likely to come fron vate sources, inquiries indicat

Seattle—Sales are small, and inquiries are for less than 100 each. Quartermaster, Fort L Wash., will receive bids April 5500 feet of 10 and 12-inch cast pipe, totaling about 200 tons.

San Francisco—Cast iron awards are limited to lots of than 100 tons and awards s this year total 6641 tons, com with 8595 tons for the same p last year. National park servi Boulder City, Nev., will open April 11 for 303 tons.

...ils, Cars

...ack Material Prices, Page 71

...ll rail tonnages continue to be ... the Virginian buying 4000 ...nd the Chicago & North West... ...00 tons. No large lots are in ...ct. New York Central last ...opened bids on its quarterly ...ements for steel. An inquiry ...en issued by the navy depart... ...for 20 locomotives of various

...hern Pacific has placed two ...nal streamlined trains with ...an-Standard Car Mfg. Co., Chi... ...or service between San Fran... ...nd Los Angeles. Cost is about ...000 for each train. Locomo... ...ave not yet been placed.

...ago, Milwaukee, St. Paul & ... has asked permission to is... ...1,920,000 in equipment trust ...ates to finance construction of ...ifty-ton box cars and 75 ca... ... in its own shops. Chicago, ...gton & Quincy has placed 25 ... highway buses for use be... ... Chicago and Los Angeles.

...ding freight car business in... ...1150 for the Missouri Pacific, ...r Denver & Rio Grande West... ...000 for Chicago, Rock Island ...ific and material for 1000 gon... ... for Illinois Central. Early ...g on these inquiries is expect...

...Orders Placed

...rn Pacific, two streamlined passen... ...trains, to Pullman-Standard Car ... Co., Chicago.

... Pacific, 300 fifty-ton flat cars, to ... shops, Omaha.

... Orders Placed

...o & North Western, 9000 tons; 6700 ... to Carnegie-Illinois Steel Corp., ...ago, 2300 tons to Inland Steel Co., ...ago.

...an Railway, 4000 tons; 3000 tons ...ethlehem Steel Co., Bethlehem, Pa., ... 1000 tons to Carnegie-Illinois Steel ..., Pittsburgh.

...motives Pending

... 20 locomotives of miscellaneous ...s; bids asked.

...es Booked

... Brill Co., Philadelphia; Ten 40-... ...enger for Duluth-Superior Transit ... Duluth.

... Coach division, General Motors ...: Twenty-five 28-passenger air-... ...litioned diesel highway coaches, ... Chicago, Burlington & Quincy rail...

... Truck & Coach Mfg. Co., Pontiac, ...: Thirteen super-coaches for Cen... ... Greyhound Lines Inc. and Capital ...yhound Lines; awarded subject to ... interstate commerce commission permission to issue equipment notes.

Wire

Wire Prices, Page 71

New York—Slight improvement in wire buying has developed during the last 10 days, but March volume was disappointing to eastern producers. Gains in specialties, notably to the wire goods manufacturing trade, are accompanied by a moderate sag in demand for spring wire and rope. Little real tonnage is coming from the automotive industry.

Boston—Wire buying shows little improvement and incoming volume with some eastern producers has declined slightly. This is reflected in finishing operations which are uneven and lower. There is no forward buying, consumers pressing for delivery. Inventories being low in most instances, the trend in buying indicates aggregate consumption has been declining.

Cleveland—A decrease during March in merchant wire products

Profits Drip Away

From bearings where wasteful liquid oil is used. Cost of lubricant is high and the need of frequent application adds to the expense. What's more, there is no assurance of positive protection from dangerous frictional wear.

Elimination of such troubles plus a decided saving is realized by using NON-FLUID OIL. Dripless, and wasteless, NON-FLUID OIL stays in bearings, lubricating dependably until entirely consumed. Keeps machines in steady operation at lowest maintenance cost. Saves money on lubricant and application cost by outlasting oil 3 to 5 times.

Send for testing sample today-prepaid. NO CHARGE!

NEW YORK & NEW JERSEY LUBRICANT CO.

Main Office: 292 MADISON AVENUE, NEW YORK

WAREHOUSES:

Chicago, Ill. — St. Louis, Mo. — Providence, R. I. — Detroit, Mich. — Atlanta, Ga. — Charlotte, N. C. — Greenville, S. C.

TRADE MARK NON-FLUID OIL REGISTERED IN U.S. PAT. OFFICE & FOREIGN COUNTRIES

MODERN STEEL MILL LUBRICANT

Better Lubrication at Less Cost per Month

business largely was the result of prior coverage. Producers look for improved consumption of barbed wire, fence, etc. in farm districts this year compared with 1938. Lawn fence has been advanced $2 a ton, while prices of other wire products are reported the firmest in a number of months.

Semifinished

Semifinished Prices, Page 71

Pittsburgh—Demand for semifinished steel shows little change. Nonintegrated mills continue to buy only for early needs and are maintaining small stocks. Tonnage varies widely from week to week, although the trend has been downward lately because of the decline in sheet specifications. Sheet bars continue the most active item, however, aided by an increase in tin plate production.

Tin Plate

Tin Plate Prices, Page 70

Tin plate demand is gaining, though improvement in some instances has been below expec Nevertheless, the outlook is re fairly promising. Buying wi shortly for plate for the crops, and releases against st orders are expected to give a boost to production, whic stands at 60 per cent.

Estimates have placed the i in tin plate production this ye 1938 at 10,000,000 boxes. This place output about 40,000,000 but well below the record 000,000 base boxes.

Perkins Man Coolers create refreshing recirculation of air without chilling drafts.

Perkins Man Coolers help to maintain production schedules in the hottest places.

Perkins Man Coolers decrease labor turnover and help to make contented workers.

PERKINS MAN COOLERS ARE MADE IN OSCILLATING AND STATIONARY TYPES, BOTH PORTABLE.

B. F. PERKINS & SON, INC. HOLYOKE, MASS.

Engineers and Manufacturers

PERKINS MAN COOLERS

TRADE MARK REG. U.S. PAT. OFF.

Shapes

Structural Shape Prices, Page

Pittsburgh — Awards are light, with a good sprinkling vate jobs in the list. New p announced continue active, al most are relatively small. Pr financed projects are also fai merous in the new inquiries. est of the new placements in 1100 tons for caissons to be us bridge for the New Hampsh Maine at Portsmouth, N. H., was awarded to Turl Engin Works.

Cleveland — Private wor failed to develop as anticipat though there has been slig provement in small private Fabricators are fairly busy o lic projects. Outstanding award went to Bethlehem Ste Bethlehem, Pa., involving 85(for the Toledo Scale Co. f building, Toledo, O. Great Dredge & Dock Co., Clevela low on 1800 tons of piling, f 4A, Cuyahoga river straigh project, here. Little improv in prices has been noted.

Chicago—New demand in a measure of improvement, substantial tonnages already ing and several large project for closing soon. Over 450(are involved in projects to be in the Chicago district this Largest of these is the south vocational school, for which board of education will receiv April 4, involving 3000 tons. of local improvements, Ch will receive bids on a tunnel struction at Wrightwood av April 3.

Boston—Although one d structural shop booked 450 to a school addition, most of th ited tonnage for fabricated rial is going to outside shops. is especially true of bridge there being no shop in this figuring bridges. Vermont ha on better than 500 tons, r small I-beams, part of which

placed through contractors.

York—Financing, which appassured, and favorable action e war department, also likely, n to be accomplished before inary action on the proposed 0,000 Battery Park-Brooklyn e will be taken. The main ng will consist of two large nsion bridges with a pier in the r north of Governor's Island. while structural activity is with new inquiry coming out , although bridges in New closing April 14 take close to ons.

ricated steel contracts closed g February totaled only 77,036 according to reports received e American Institute of Steel ruction. This represents a antial decline from the 101,559 booked during January, but ned substantially above the tons placed during February, Bookings for the first two hs this year were approxiy 130 per cent of tonnage during the comparable pe- in 1938. Shipments during February and January of this were slightly less than the orders, indicating a growth in ogs. Totals for the first two hs are: Bookings, 178,595 tons, ents 168,065 tons. This com- with 137,464 and 168,924 tons ctively.

ffalo—Continued flow of school cts is keeping most fabricators busy, although aggregate ton- of awards is only moderate. ral contracts have been anced on many projects, but the ds are slow in closing.

iladelphia—Little change has oped in the structural market. nly favorable development has appearance of more private . Prices continue weak with work reappearing for new bids.

attle—New projects are develg slowly and immediate pros- are not promising. Larger ts have a fair volume under Week's largest award, 500 or more for power line towers over the Columbia river for the Bonneville authority, went to the Lehigh Structural Steel Co., Allentown, Pa. Schmitt Steel Co., Portland, will furnish stoplogs for the Coulee dam project, involving 195 tons.

San Francisco—Only three new inquiries developed during the week and aggregated less than 600 tons. Pending business involves less than 3500 tons. Awards totaled 2082 tons and brought the year's aggregate to 35,396 tons, compared with 24,440 a year ago.

pe Awards Compared

	Tons
k ended April 1	32,489
k ended March 25	15,840
k ended March 18	22,227
week, 1938	17,510
kly average, year 1938	21,566
kly average, 1939	25,437
kly average, February	17,123
l to date, 1938	193,694
l to date, 1939	305,242

ludes awards of 100 tons or more.

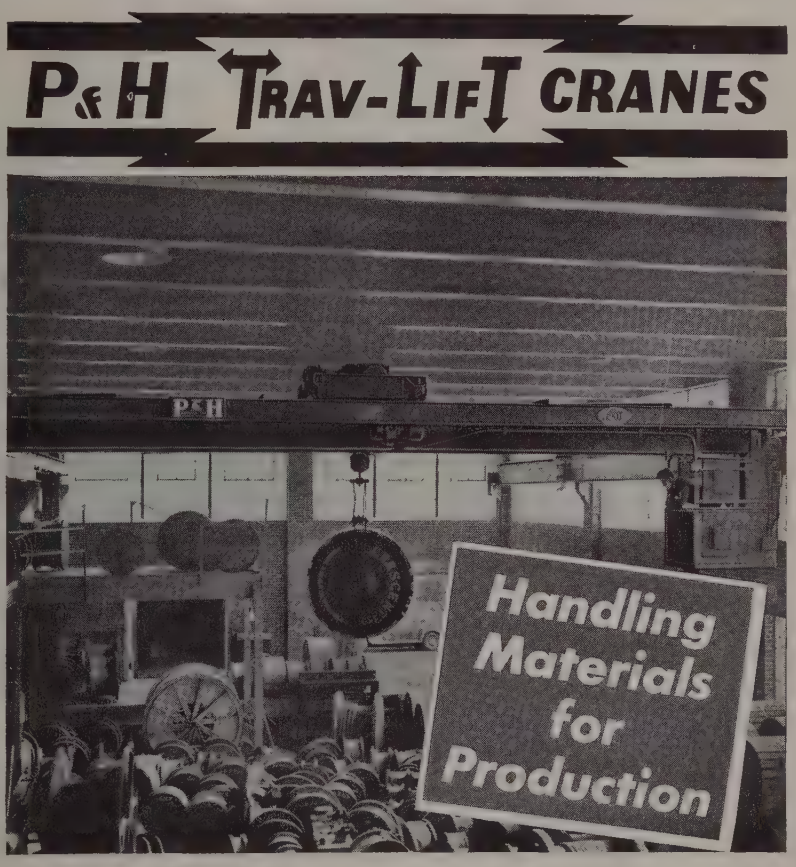
Shape Contracts Placed

9000 tons, sheet piling, substructure, bridge, Popes Creek, Md., to Carnegie-Illinois Steel Corp., Pittsburgh; through Merritt-Chapman & Scott, New York. Also 1400 tons of forms and protection plates for the same project to Carnegie-Illinois Steel Corp.

4000 tons, bridge, Seattle, to Pacific Car & Foundry Co., Seattle, through Puget Sound Construction Co., Seattle.

2000 tons, sheet piling, Greenville, Miss., substructure for bridge across Mississippi river, to Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

1100 tons, caissons for bridge, Portsmouth, N. H., for New Hampshire and Maine, to Turl Engineering Works.



Where you repeat the process of handling materials in production, it is frequently possible to reduce costs substantially by using a P&H Trav-Lift Crane. Designed for moderate service, these low-cost installations are saving money in many types of work. Bulletin H-13 describes them; gives complete engineering data on all sizes and types from 1 to 15 tons capacity. Ask for your copy. Harnischfeger Corporation, 4411 W. National Avenue, Milwaukee, Wis.

HARNISCHFEGER CORPORATION
HOISTS · WELDING ELECTRODES · MOTORS P&H EXCAVATORS · ELECTRIC CRANES · ARC WELDERS

1000 tons, state hospital building, Staten Island, N. Y., to Belmont Iron Works, Philadelphia; through Caye Construction Co., New York.

990 tons, curb angles, department of purchase, New York, to American Bridge Co., Pittsburgh.

850 tons, factory and office building, Toledo Scale Co., Toledo, O., to Bethlehem Steel Co., Bethlehem, Pa.

845 tons, transmission towers, Houston Lighting & Power Co., Houston, Tex., to Emsco Derrick & Equipment Co., Houston.

663 tons, highway bridge, Georgetown, Tex., to Virginia Bridge Co., Roanoke, Va.

650 tons, Delaware aqueduct, contract 321, Carmel, N. Y., to American Bridge Co., Pittsburgh.

560 tons, Isolation hospital, medical center, Jersey City, N. J., to Lehigh Structural Steel Co., Allentown, Pa.

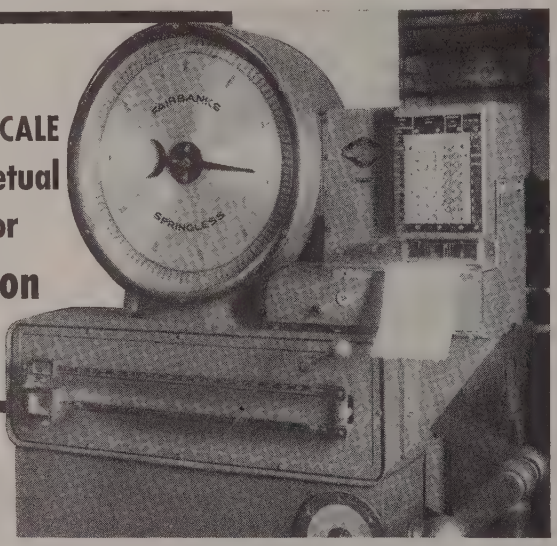
500 tons or more, 14 high crossing towers, for Bonneville authority, to Lehigh Structural Steel Co., Allentown, Pa.

460 tons, contract D4, Dearborn street subway, Chicago, to American Bridge Co., Pittsburgh.

450 tons, additions Cambridge High and Latin school, Cambridge, Mass., to New England Structural Co., Everett, Mass.; Rugo Construction Co., Boston, general contractor.

450 tons, head frames, Delaware Aqueduct, contract 313, New York, to Archer Iron Works, New York.

FAIRBANKS PRINTOMATIC SCALE Maintains Perpetual Inventory for Parker-Kalon Corp.



The weighing unit at Parker-Kalon consists of a Fairbanks 6000-lb. all-metal self-contained warehouse scale with cabinet dial, Printomatic Weigher, and tare beam.

A Fairbanks Printomatic scale provides a complete, printed record of each stock room transaction for the Parker-Kalon Corporation of New York City. It makes a printed record that shows the *weight of material, source of supply, size of material, number of pieces,* and whether the material is *incoming* or *being withdrawn.* All of this information is automatically printed on a roll tape by the Fairbanks Printomatic. At the end of each day, the tape is used by the purchasing and auditing departments to check incoming shipments and maintain a perpetual inventory. There are no hastily scrawled records to decipher—no incorrect readings to throw the accounting system out of balance. Little errors in weight reading and recording that could add up to big losses are practically impossible in this plant.

Fairbanks Printomatic scales and their many applications are discussed in detail in a bulletin we will gladly send you. Write Fairbanks, Morse & Co., Dept. 96, 600 S. Michigan Ave., Chicago, Ill. Branches and service stations throughout the United States and Canada.

7567-SA40.67

FAIRBANKS MORSE Scales

DIESEL ENGINES · PUMPS · ELECTRICAL MACHINERY · FAIRBANKS SCALES · RAILROAD EQUIPMENT · WATER SYSTEMS · WASHERS-IRONERS · FARM EQUIPMENT · STOKERS · AIR CONDITIONERS

415 tons, Cuyler school, Trenton, to Bethlehem Steel Co., Bethleher through N. A. K. Bugby Co., Tr N. J.

410 tons, 13-story apartment, M avenue-Seventy-third street, New to Dreier Structural Steel Co., York.

389 tons, bridge, proj. 262D, P River, Montana, to Missouri Bridge & Iron Co., Leavenworth,

370 tons, underpass material, Balt & Ohio railroad, Lorain, O., to negie-Illinois Steel Corp., Pitts

330 tons, alterations to cupolas, duction foundry, Ford Motor Co troit, to Taylor & Gaskin, Det

327 tons, highway bridges, C county, Texas, to Mosher Stee Houston, Tex.

315 tons, Fort Greene health c Brooklyn, to Weatherly Steel Co. York; through Sheppard-Pollock New York.

315 tons, Central junior-senior school, Hyde Park, N. Y., to Be Iron Works, Philadelphia.

310 tons, maintenance buildings, N and 11, city of Cleveland, to Bethl Steel Co., Bethlehem, Pa.

300 tons, school, Each park, Pough sie, N. Y., to Belmont Iron W Philadelphia.

295 tons, state bridges, Trumbull Westport, Conn., to American B Co., Pittsburgh; through Mariani struction Co., New Haven.

260 tons, building, Newport Rolling Co., Newport, Ky., to Interna Steel Co., Evansville, Ind.

250 tons, reconstruction, Berkley bridge, Boston, to American B Co., Pittsburgh.

235 tons, office and warehouse ing, St. Louis, to Mississippi V Structural Steel Co., Decatur, I

235 tons, state highway bridge FAC Letcher county, Kentucky, to burgh-Des Moines Steel Co., burgh.

235 tons, high school, Norwalk, C Klein Steel Co., Bellevue, O.

230 tons, bottling plant, Coca-Cola Philadelphia, to American Bridge Pittsburgh; through Wark Co., P delphia.

230 tons, additions, building 72, A can Magnesium Corp., Clevelan American Bridge Co., Pittsburgh.

220 tons, bridge FAGM-H-289, U county, Texas, to Austin Bros., D

220 tons, alterations and garage, eral Baking Co., New York, to lehem Fabricators Inc., New through Equity Construction Co., York.

205 tons, bridges, Quincy, Ill., Chi Burlington & Quincy railroad, t seph T. Ryerson & Son, Inc., Chi

200 tons, warehouse, Anchor Hoc Glass Corp., Salem, N. J., to Bel Iron Works, Philadelphia.

200 tons, stadium, Massillon, O. American Bridge Co., Pittsburgh.

200 tons, high school, Hamburg, N. Ernst Iron Works Inc., Buffalo.

195 tons, stop logs for Coulee dam Schmitt Steel Co., Portland, Oreg.

190 tons, spec. 1187D, bureau of recl tion, Boulder City, Nev., to Int tional Derrick & Equipment Co., lumbus, O.

180 tons, Dauphin county hospital, P sylvania, to Bethlehem Steel Co., B lehem, Pa.

170 tons, bus structure, specific 1187-D, Boulder City, Nev., to I national Derrick & Equipment Co., Angeles.

165 tons, school, Lynbrook, N. Y. Bethlehem Fabricators Inc., New Y through Andrew Weston Co., New Y

160 tons, auditorium, Marina junior school, San Francisco, to Golden Iron Works, San Francisco.

140 tons, addition to high school, C

N. Y., to American Bridge Co., burgh.

ns, warehouse, Kroehler Co., Dal- Tex., to Mosher Steel Co., Dallas.

ns, H columns, bridge, Guerneville, f., to Bethlehem Steel Co., Bethle- , Pa.

ns, for Sand Point, Seattle, naval station, to Midland Structural Steel Chicago.

ns, Rines Hill grade crossing over ne Central railroad, Augusta, Me., American Bridge Co., Pittsburgh.

ns, signal bridges, Chesapeake & railway, Barboursville to Peach k, W. Va., to American Bridge Co., sburgh.

ons, rollerdrome, Western Hills atorium, Inc., Cincinnati, to Wil- Lang & Sons Co., Cincinnati.

ns, spec. 1196D, bureau of reclama- , Loveland, Colo., to Joseph T. Ry- n & Son Inc., Chicago.

ns, undercrossing of Southern Pa- tracks, Riverside county, Califor- to unnamed interest.

ons, school addition, Wilmington, to Champion Bridge Co.

ns, central school, East Penbrook, Y., to F. L. Heughes & Co. Inc., hester, N. Y.

pe Contracts Pending

tons, board of education, south e vocational school, Eighty-seventh eet and Jeffery avenue, Chicago, s April 4.

tons, piling, Cut 4A, Cuyahoga river aightening project, Cleveland; Great kes Dredge & Dock Co., Cleveland, .

tons, garage, 215th street, New York, s to procurement division, treasury partment, New York.

tons, infirmary buildings, Willow- ok, N. Y., for state.

tons, hospital building, Staten and, N. Y.; Caye Construction Co., w York, low.

tons, municipal pumping station, icago.

tons, underpass construction, Dal- rt, Tex., bids in.

tons, Laramie avenue viaduct, Mor- Handler & Co., Chicago, low bidder general contract.

tons, state bridge, Bloomington, Ill.

ons, Teton river bridge, Teton coun- Montana; bids opened.

tons, steel structures, substation, nneville dam, Oreg.; Bethlehem Steel ., San Francisco, low.

tons, piling, Erie avenue and East venty-first street bridges, Lorain, O.; eat Lakes Dredge & Dock Co., Cleve- nd, low, also includes 230 tons of rs.

tons, high school, Clyde, N. Y.; bids ril 7.

tons, four span bridges, route 6, ctions 8 and 9, Clifton, N. J.; bids ril 14, E. Donald Sterner, state ghway commissioner, Trenton, N. J.

tons, highway bridge, Miles City, ont., bids in.

tons, viaduct, Fairbury, Nebr., for ate.

tons, office and garage, state of New rsey, Newark; bids April 14.

tons, housing project, Chatham ark Inc., Chicago.

tons, bridge, six plate girder spans, bout 325 feet, over Delaware, Lacka- anna & Western railroad, Mountain iew, N. J.; bids April 14, E. Donald erner, state highway commissioner, renton, N. J.

300 tons, dumping platform and shed, pier 99, New York.

300 tons, state bridge, Marble Cliff, O.

250 tons, bridge over Mississippi river, Moselle, Mo., St. Louis-San Francisco railway.

250 tons, mill building, Andrews Steel Co., Newport, Ky.

250 tons, state bridge, FAP-237-D, Bonner, Mont.

235 tons, state bridge over Shetucket river, Norwich, Conn.

235 tons, superstructure, Hiwassee power house, Turtleton, Tenn., for TVA.

224 tons, bridge, Brady, Tex., bids in.

220 tons, Mills bridge, Tillamook county, Oregon; bids April 7.

215 tons, state highway bridge, Nallen, W. Va.

208 tons, board of local improvements tunnel construction, Wrightwood avenue, Chicago, bids April 3.

200 tons, alterations to high school, Lynbrook, N. Y.

200 tons, seven temporary foot bridges, track elevation project, Winnetka, Ill., bids April 4.

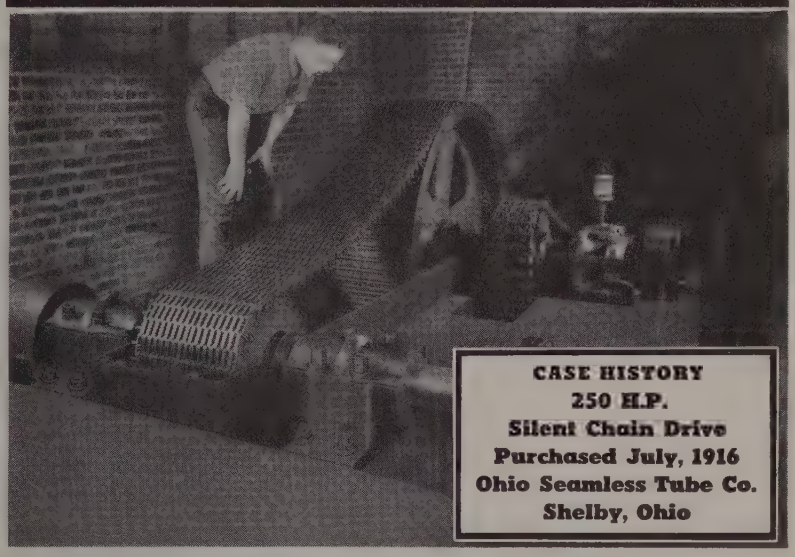
195 tons, men's dormitory, Ohio state university, Columbus, O.

180 tons, Chippewa street underpass, St. Louis; Stiers Construction Co., St. Louis, low.

175 tons, women's dormitory, Miami university, Oxford, O.

175 tons, state bridge, Columbus, O.

SILENT CHAIN PERFORMANCE FACTS



REPAIR PARTS COST ONLY $3.19 PER YEAR
—here's proof of amazing cash savings!

● When it comes to long life and low maintenance expense there is no other type of drive that can even approach the efficiency of the Link-Belt Silverstreak silent chain drive. It requires practically no attention and little upkeep. Definite proof of this is illustrated above—the chain drive shown has been operating steadily for 22 years and has required in all that time a total repair cost of only $70.00, which figures a mere $3.19 per year. Think of this the next time you buy a "drive." Get your money's worth—specify Link-Belt Silverstreak Silent Chain Drives! Send for Data Book No. 125.

LINK-BELT COMPANY

Indianapolis Chicago Philadelphia Atlanta San Francisco Toronto
Branch offices and distributors located in all principal cities 7505-C

LINK-BELT

SILVERSTREAK SILENT CHAIN DRIVES

Behind the Scenes with STEEL

Progeny

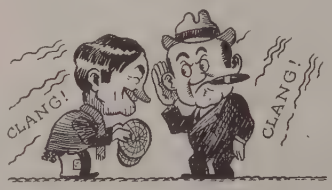
■ Over in the Bronx Zoo last week there came into this hectic world two little creatures known as *aoudads,* which our secret operatives tell us are wild sheep of north Africa. This happy event, although perhaps unusual, would no doubt have escaped our bleary eye but for the fact that one John Toomey, keeper of the Zoo, tenderly patted each little aoudad on the head and christened them *Etaoin* and *Shrdlu,* which casts an entirely different light on the whole thing, as you can see. When quizzed on the affair Mr. Toomey admitted he couldn't pronounce either name (*imagine!*) but said he thought they were particularly appropriate for two newly born aoudads. Hardly had Mr. Toomey done his deed than Typographical Union No. 6 of the metropolitan region hopped up to say they figured they had exclusive rights to these monikers and at the moment we are knee-deep in lawyers trying to figure out our own next move. Any suggestions?

Are You A Snake?

■ Revere Copper & Brass, Inc. has been getting out a series of very clever employes' letters, designed to keep Revere workers better informed on the policies and business of the company. Letter No. 5, just out, tells the story of Revere and the U. S. Navy, including some samples of sea going slang. *Skag,* they say, is a coffin nail or cigarette; *Red Eye* is catsup to you; *Seaweed* is the Navy's apology for spinach; and a *Snake* a nautical lady-killer.

A Bit Mossy

■ A reader who prefers to shroud his identity, because he always digs up stories that came over on the Mayflower, sends in the wheeze about London's famous "Big Ben". An American tourist was listening to the deep, sepulchral tones of the historic bell, and as he stood, lost in reflection, a bedraggled subject of George VI shuffled up alongside, motivated to make a small touch. "Ain't that there bell a wonder?" said the subject, opening the conversation. "What say?" said the pilgrim, cupping his ear. "Hi say," resumed the bedraggled one, "Ain't



that there bell a wonder? Listen to them tones—" "You'll have to speak louder," bellowed the tourist, "I can't hear a word you're saying on account of that damn bell!"

Special Feature

■ Next week in STEEL there will appear the most complete story on sponge iron that has ever been published. It will run as a special 12-page insert and if you want any additional copies a few will be available but we suggest you get your request in early.

Mike the Mischievous

■ A case of the National Labor Relations board, initiated back in 1937 against the Cincinnati Milling Machine Co., has been settled out of court. The complainant, who is a former employe and president of the C.I.O. local at the plant, had a lot of nerve ever starting the case with the name he has: *Mike Mischeff.*

Some Specs

■ Maybe you can blame this story on those few "spring-fever" days last week. It seems this fellow had been troubled with spots before his eyes so he went to see an optometrist, who assured him he could fix everything with a pair of specs which would be ready the following day. And the next day when our friend tries the glasses on the optometrist asks: *There, isn't that better?* to which the screwball replies: *Oh yes, that's swell. I can see the spots a lot plainer now!*

SHRDLU

175 tons, state bridge, Rock Fal
170 tons, beam bridge over Bos Maine railroad, Bernardstown, for state.
156 tons, state girder bridge, county, Washington; bids to Ol April 11.
153 tons, state undercrossing, S bids to Olympia, April 11.
145 tons, factory building, I Cherry & Fruit Co., Covington,
140 tons, Remsen avenue bridg Angeles; bids soon.
140 tons, viaduct, Murray, Nebr state.
135 tons, bridges, Missouri Pacifi road, in Missouri and Kansas.
125 tons, beam bridge over New New Haven & Hartford railroad lingham, Mass., for state.
115 tons, fat rendering plant, & Co., Philadelphia.
Unstated tonnage, two 5-span ste concrete state spans; bids in a ena, Mont.

Reinforcing

Reinforcing Bar Prices, Page 7

Pittsburgh—New projects in ing tonnages above 100 tons are There is still fair activity in sm jobs, but currently the chief ac is confined to placements on tonnages still pending. Clark ley dam, near Harrisburg, Pa., for 300 tons. Prices are still ing relatively firm in most sec

Cleveland—Public work cont to dominate reinforcing awards inquiries, although some imp ment in private projects invo tonnages under 50 tons has oped. A number of school pro are scheduled to appear for within the next 30 days. Lakes Dredge & Dock Co., land, is low on 500 tons for the structure Erie avenue and Twenty-first street bridges, Lo O. Prices continue weak.

Chicago—Recent closings an quiries involve no new pro over 100 tons, but an unusually stantial accumulation of tonna still pending, with small jobs prising a large part of this dem Backlogs continue sizable, some quarters reporting diffi in making the required promp liveries. One interest estim March shipments were the hig in the last ten years. Private struction is tending upward rap although its requirements us are small individually. Chi subway construction continue be the largest single source o mand, with another section s uled to be bid April 6, and se more sections expected out fo timates shortly.

New York—Reinforcing bar nage up for bids or pendin heavier, led by 3000 tons for a

f the East river drive, New closing April 3. Awards in- 15 tons for a Circumferential ay section, New York. For ge approach over Highbridge New York, bids are in on ns. Concrete bar prices tend slightly steadier.

adelphia—Mills have experi- moderate increase in demand fabricators to replenish de- inventories. This is considered ecting a rising volume of small as large projects continue Prices on fabricated mate- e still easy.

ttle—Requirements of Coulee eatured the reinforcing mar- is week. Aside from federal g, demand is slow and no large re out for figures. Reclama- oureau, Denver, has awarded tons to Bethlehem Steel Co. order will likely be rolled at eattle plant. Same office on 24 opened bids for 2220 tons und and square bars for the e project.

Francisco—While demand, ally, has fallen off sharply dur- e past week or two, the rein- g bar market was the most ac- ne with 4147 tons booked. This ht aggregate for the year to tons compared with 24,459 in Included among the larger gs was 679 tons for a crossing erkeley, Calif., secured by Co- a Steel Co., San Francisco. Few inquiries came into the mar- or figures and the largest one not call for more than 135 tons. pending business aggregate a over 5700 tons.

nforcing Steel Awards

tons, material for Coulee dam, to hlehem Steel Co., San Francisco.

ons, bridge, Popes Creek, Maryland, Carnegie-Illinois Steel Corp., Pitts- gh.

ons, warehouse, United States To- co Co., Richmond, Va., to Truscon el Co., Youngstown, O.; through n Felmley, Bloomington, Ill., con- tor.

ncrete Bars Compared

	Tons
k ended April 1.....	11,872
k ended March 25	9,113
k ended March 18	8,558
week, 1938	3,173
kly average, year, 1938	6,959
kly average, 1939.....	11,911
kly average, February.	8,268
l to date, 1938	66,079
l to date, 1939.....	142,937

ludes awards of 100 tons or more.

725 tons, post office garage, St. Louis, to Laclede Steel Co., St. Louis; J. S. Alberici, St. Louis, contractor.

679 tons, University avenue crossing, Berkeley, Calif., to Columbia Steel Co., San Francisco.

541 tons, post office and court house, Fresno, Calif., to Ceco Steel Products Corp., San Francisco.

500 tons, East side high school, Rockford, Ill., to Joseph T. Ryerson & Sons, Chicago.

500 tons, five barrack buildings, Fort Clayton, Canal Zone, to Bethlehem Steel Exporting Co., New York; Robert E. McKee, El Paso, Tex., general contractor. Western Ornamental Iron Works, Los Angeles, awarded 50 tons, structural steel.

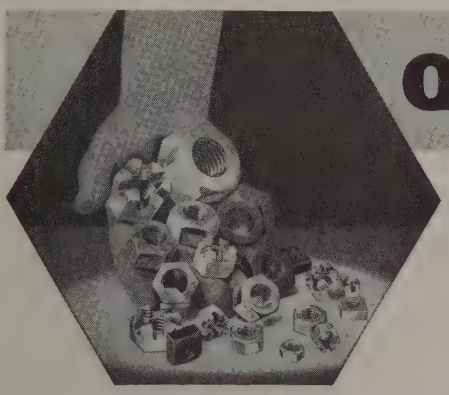
492 tons, five highway bridges, Passaic county, New Jersey, to Bethlehem Steel Co., Bethlehem, Pa.; Ell-Dorer Contracting Co., contractor.

475 tons, library, Toledo, O., to Pollak Steel Co., Cincinnati; Frank Messner & Sons, Cincinnati, contractors.

400 tons, sewage plant, Stevens Point, Wis., to Joseph T. Ryerson & Sons, Chicago.

315 tons, contract MC-39-7, circumferential highway, New York, to Igoe Bros., Newark, N. J.; through Elmhurst Contracting Co., New York.

310 tons, contract 4, East river drive, New York, to Fireproof Products Co., New York; through Del Balso Construc-



QUALITY

BOLTS EMPIRE NUTS-RIVETS

TRUE quality is embodied in a product only through uninterrupted maintenance of the highest manufacturing standards and practices over a long term of years. Continuously maintained quality requires experience, stability and a progressiveness that makes the best use of up-to-date plant and equipment, seeks out and applies the newest methods and materials, keeps both operating staff and management ever in step with the trend of the times.

Quality has always been the very basis of R B & W policy for nearly a century—a policy passed along from worker to worker throughout the entire organization and reflected in the unsurpassed, uniform accuracy of every EMPIRE Brand Bolt, Nut and Rivet.

BOLTS: Carriage • Machine • Lag • Plow • Stove • Elevator • Step • Tap • Wheel & Rim • Battery • U-Bolts • Tire • Automotive • Drilled • Faced • Special Heat Treated • Etc. NUTS: Cold Punched • Semi-Finished • Hot Pressed • Case Hardened • Slotted • Castle • Machine Screw • Marsden Lock • Low Sulphur • RIVETS: Standard • Tinners' • Coopers' • Culvert • Clevis and Hinge Pins • SCREWS: Cap • Machine • Hanger • Sheet Metal • Phillips Recessed Head • WASHERS: Plate • Burrs • MATERIALS: Steels • Alloys • Nonferrous Metals • Brass • Bronze • Everdur • Herculoy and others • RODS: Stove • Seat • Ladder • PLATED PARTS: Cadmium • Zinc • Chromium • Nickel • Hot Galvanized • Copper • Tin • SPECIAL UPSET & PUNCHED PRODUCTS

RUSSELL, BURDSALL & WARD
BOLT AND NUT COMPANY
PORT CHESTER, N. Y. ROCK FALLS, ILL. CORAOPOLIS, PA.
SALES OFFICES: CHICAGO • DETROIT • PHILADELPHIA
DENVER • SAN FRANCISCO • LOS ANGELES • SEATTLE • PORTLAND

9020

tion Co., New York.

300 tons, apartment, Wells street, Milwaukee, to Truscon Steel Co., Youngstown, O., through W. H. Pipkorn, Milwaukee.

250 tons, Central grade and high school, Cortland, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.; Kraft & Detor, Syracuse, N. Y., contractors.

250 tons, bridge, Cherry street, Milwaukee, to Youngstown Sheet & Tube Co., Youngstown, O., through Worden-Allen Co., Milwaukee.

225 tons, auditorium, E. Lansing, Mich., to Capitol Steel Corp., Lansing, Mich.

200 tons, sewage disposal plant, Pontiac, Mich., to Pollak Steel Co., Cincinnati.

160 tons, sewage treatment plant, Franklin, Pa., to Fort Pitt Bridge Works, Pittsburgh; Couse & Sanders, Detroit, contractors.

150 tons, factory building, for King-Seeley Corp., Ann Arbor, Mich., to Joseph T. Ryerson & Sons, Chicago; W. E. Wood Co., contractor.

145 tons, school, Weehawken, N. J., to Ceco Steel Products Co., Jersey City, N. J.; through Auf De Heide Co., Union

135 tons, bureau of reclamation, Denver, spec. A-33835-A, to Columbia Steel Co., San Francisco, for delivery at Beuna, Wash., bids March 8.

120 tons, court house addition, Huntington, W. Va., to West Virginia Rail Co., Huntington, W. Va., through Engstrom & Wynn, contractors.

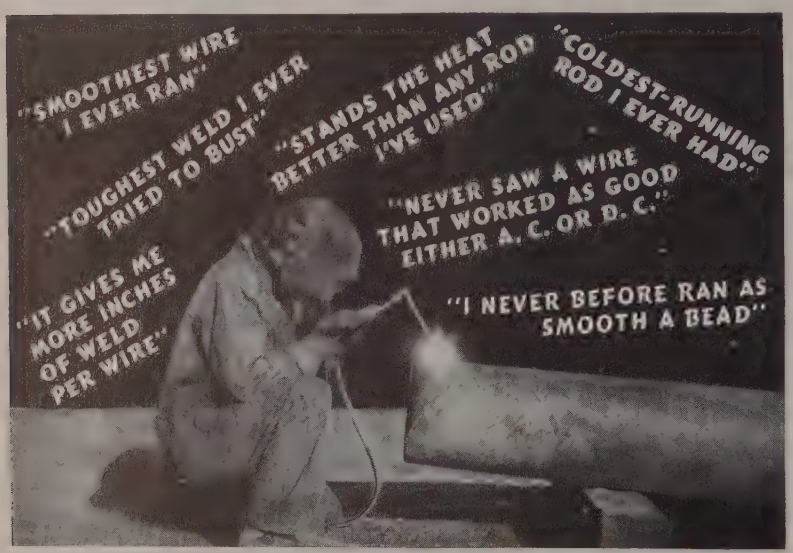
110 tons, superstructure, machine shop, Mare Island navy yard, Calif., to W. S. Wetenhall Co., San Francisco.

100 tons, men's and women's dormitories, Ohio university, Athens, O., to West Virginia Rail Co., Huntington, W. Va., Robert H. Evans Co., Columbus, contractor.

100 tons, gymnasium and auditorium, Decatur, Ill., to Laclede Steel Co., St. Louis. (WPA)

100 tons, Central high school, Corfu, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.

100 tons, building, Phillips Pump & Tank Co., Cincinnati, to Jones & Laughlin Steel Corp., Pittsburgh; through Parkway Construction Co., Cincinnati.


"SMOOTHEST WIRE I EVER RAN"
"TOUGHEST WELD I EVER TRIED TO BUST"
"STANDS THE HEAT BETTER THAN ANY ROD I'VE USED"
"COLDEST-RUNNING ROD I EVER HAD"
"NEVER SAW A WIRE THAT WORKED AS GOOD EITHER A. C. OR D. C."
"IT GIVES ME MORE INCHES OF WELD PER WIRE"
"I NEVER BEFORE RAN AS SMOOTH A BEAD"

Listen to what the welders say about **PAGE Hi-Tensile "G"**

Ask any welder who has run Page Hi-Tensile "G" what he thinks of the rod. He'll tell you it's remarkably fast, and gives a bead of surprising smoothness and unusually high ductility. He'll tell you it's a very quiet rod, with little spatter. Whether he has used it on production work, maintenance work or construction work, he will have found it practical under all operating conditions.

Get in touch with your local Page distributor. He has information you should have about Hi-Tensile "G" and other Page welding electrodes.

BUY ACCO QUALITY *in Page Welding electrodes, Page Chain Link Fence, Tru-Lay Preformed Wire Rope, Reading-Pratt & Cady Valves, Campbell Abrasive Cutting Machines, American Chains (Welded and Weldless), and Wright Hoists.*

PAGE STEEL AND WIRE DIVISION
MONESSEN, PENNSYLVANIA

AMERICAN CHAIN & CABLE COMPANY, Inc.

AMERICAN CHAIN DIVISION • AMERICAN CABLE DIVISION • ANDREW C. CAMPBELL DIVISION • FORD CHAIN BLOCK DIVISION • HAZARD WIRE ROPE DIVISION • HIGHLAND IRON AND STEEL DIVISION • MANLEY MANUFACTURING DIVISION • OWEN SILENT SPRING COMPANY, INC. • PAGE STEEL AND WIRE DIVISION • READING-PRATT & CADY DIVISION • READING STEEL CASTING DIVISION • WRIGHT MANUFACTURING DIVISION • IN CANADA: DOMINION CHAIN COMPANY, LTD. • IN ENGLAND: BRITISH WIRE PRODUCTS, LTD. • THE PARSONS CHAIN COMPANY, LTD. • *In Business for Your Safety*

Reinforcing Steel Pend

3000 tons, contract 6, East river New York; bids April 3.

2220 tons, for Coulee dam; bids Denver.

1550 tons, New York approach, nc portion, Harlem river speedway Washington bridge connection, bridge Park, New York; North Construction Co., New York, low

1000 tons or more, Ballard brid construction, Seattle; bids to April.

950 tons, science building, junior San Francisco; Clinton Const Co., San Francisco, general con

500 tons, substructure, Erie aven East Twenty-first bridge, Lora Great Lakes Dredge & Dock Co., land, low.

460 tons, Joplin, Mo., viaduct; Construction Co., Springfield, M

300 tons, Clark valley dam, Harr Pa.

248 tons, St. Louis, Chippewa str derpass; Stiers Construction Co.,

200 tons, Carrville, La., addition rine hospital; Raisler Engineeri New York, low.

200 tons, high school, Clyde, N. Y April 7.

185 tons, four bridges, route 6, s 8 and 9, Clifton, N. J.; bids Ap E. Donald Sterner, state highwa missioner, Trenton.

132 tons, Arroyo de la Laguna Alameda county, California; bid 12.

115 tons, alterations and additi commissary building, Horn & H Philadelphia.

103 tons, library and administ building, University of Californi vis, Calif.; Carl N. Swenson Co Jose, Calif., general contractor.

101 tons, Long Valley dam, Los An bids April 18.

100 tons, plate girder bridge over ware, Lackawanna & Western road, Mountain View, N. J.; bids 14, E. Donald Sterner, state hi commissioner, Trenton.

Unstated tonnage, steel and co state span, Powder river, Mont. P. Roscoe, Billings, Mont., g contractor.

Pig Iron

Pig Iron Prices, Page 72

Pittsburgh — March pig iron ments were about equal to Febru but on a daily basis were lo Some foundries still are taking livery against low-price conti placed last fall. Prices are st on new business. The coke ma is weak, with demand lately ten downward. Production of pig and coke shows little change.

Cleveland—Except for the ma of the month's extra days, M pig iron shipments held closel the February movement. Four operations tended upward grad the past 30 days, however, and t are expectations of heavier d

in April. Improvement in the has been well diversified, al- h output of automotive cast- has changed little. New busi- has increased slightly with the ng of third quarter books but s restricted by tonnage not yet ed against old contracts.

icago—Shipments in March about 3 per cent improved over revious month, and almost iden- with January figures. A marked ovement was made in actual , however, but present ordering potty. Foundry melt is un- ged in recent weeks, as evi- ed by the unvarying rate of by- uct foundry coke shipments. motive and agricultural cast- demand continues a prominent ort. Railroad business has yet sert itself.

ston—Pig iron buying has kened, demand being confined ly to small spot lots while ship- ts against contracts are barely tained with little change in dry melt. Consumption by works also tends downward. Everett furnace will probably n blast about May 1.

ew York—Sales are light and anged. Consumer stocks gen- y are low, except for a few of arger users. Demand from ma- e foundries is perhaps outstand- but is spotty. Export inquiry ght. The New York state barge l will open its navigation sea- about April 12, permitting wa- movement from the Buffalo fur- s.

iladelphia—A district merchant rest is planning tentatively to in a stack in April, since some les of iron are depleted. March ments were ahead of both Feb- y and a year ago, but new buy- is mostly in carlots.

wenty seven Philadelphia dis- foundries had 2606 tons of pig on hand March 1, a decline of per cent from a month ago and per cent from a year ago. Op- ions currently are estimated at 0 per cent. Stocks in the Read- area also are low.

uffalo — Shipments are slow to nd, but producers express con- nce over the outlook. Orders are icient to absorb output main- ed at 57 per cent of capacity. ndry operations vary, and al- gh some jobbing plants are king five days weekly, the av- ge for the district is around e days.

incinnati — Shipments of pig in March showed no improve- t over February. Consumers not building inventory and, in y cases, are specifying only on ent need. Considerable contract- ing for second quarter has been done but most of the tonnage was for minimum requirements and placed with customary suppliers.

St. Louis — Pig iron buying is quiet but most melters have made second quarter commitments. Shipments are holding up well, a small gain being shown for March over February. Farm equipment builders, operating at a good rate for some time, are reported somewhat uncertain as to future schedules.

Birmingham, Ala.—Pig iron production has been tapered to meet decreased operating schedules in the open-hearth division with the result that 14 blast furnaces are in this week. One was taken off by Tennessee Coal, Iron & Railroad Co. early last week.

Toronto, Ont. — While some inquiries have appeared, second quarter contracting is slow. Demand is principally in small spot sales. Deliveries average about 1200 tons weekly. Three blast furnaces now are active.

★ SUPERIORITY promised by the CONCAVE roller design of Shafer Bearings has been borne out in actual performance during years of service on many of the severest types of industrial applications. Only Shafer combines generous radial-thrust capacity, integral self-alignment and simple adjustability—"everything you need in a roller bearing."

Available in a full range of sizes: Pillow Blocks · Welded Steel Pillow Blocks · Flange Units · Take-up Units · Hanger Boxes · Cartridge Units · Flange-Cartridge Units · Duplex Units · Conveyor Rolls · Radial-Thrust Roller Bearings

Catalog No. 14 gives complete data on Shafer Roller Bearings and Units. Write for your copy.

SHAFER BEARING CORPORATION
35 East Wacker Drive • Chicago, Illinois

SHAFER *Self-Aligning* **ROLLER BEARINGS**

Scrap

Scrap Prices, Page 74

Pittsburgh — Scrap prices tend to soften, although no buying has appeared to support changes in mill quotations. Open-hearth grades are more plentiful, and in covering contracts for No. 1 steel, supplies at $15.75 have increased. Odd cars are reported moving at $15.50, returning the range on this grade to $15.50 to $16. One mill has inquired for No. 1 steel at $15.50, with no takers. Most orders still outstanding were placed at $16.

Cleveland—Buying of steelmaking scrap continues at a minimum and shipments are held to consumers' needs. Railroad offerings are small. Several minor grades have been advanced 50 cents to $1 per ton to bring them into line with more active grades. Prices are unchanged in the Youngstown district.

Chicago — Prices generally are steady, but lack of trading in on the part of dealers and br gives indications of some so in heavy melting steel. Broker sufficiently well covered to re little additional tonnage for se weeks. Prospects for renewe mand from mills are clouded b recent letdown in district steel ing.

Boston—Domestic demand scrap, both New England and ern Pennsylvania delivery, cont dull with prices unchanged on tically all grades. Most No. 1 is being picked up by nearby f ries with $12.50, delivered, ge ly paid. Steelworks are b little with indications ingot pr tion will decline at one works.

New York—Although a few tered cargo lots have been b by representatives of the Euro scrap cartel now in this countr tonnage business has been pi due to differences as to prices. the small lots slightly higher p are reported, close to $16, f.a.s. member of the British deleg has returned and the others wil in a few days. Domestic price generally unchanged and most ern Pennsylvania steel mills are ing small shipments, with bu light.

Philadelphia—Two members the European scrap cartel con tee have returned home, and understood no orders were pl in this country. So far this has without effect on prices, nor reaction expected, especially in of the continued heavy move to Japan. March exports Philadelphia alone were more 2000 tons, about 90 per cent of w was for Japan. Brokers' offe prices on export tonnage are un stood to range to $15.50 for N but No. 2 is easier with some a able at $13 and $13.25. Dom prices are firm, with specialties machine turnings up 50 cents. ern mills are charging a larger centage of turnings. Heavy ca an exception to current firm E. G. Budd Mfg. Co. took bids M 31 on 3400 tons of new compre sheets.

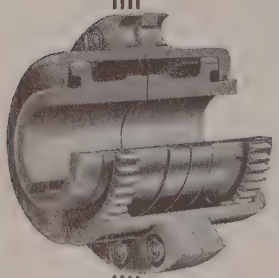
Buffalo — The market is ste despite absence of new sales. ers and consumers still are un to agree on prices, and No. 1 s nominally continues $13.75 to $1 An occasional sale of cast scra reported at $15 to $15.50 for N and $14.50 to $15 for cupola.

Birmingham, Ala.—Scrap is pecially inactive in all major gra but with about the average m ment of No. 1 cast and some s tered lots of heavy melting.

Detroit—Scrap prices are changed, pending the outcome bidding on recent automotive li

POOLE

FLEXIBLE COUPLINGS

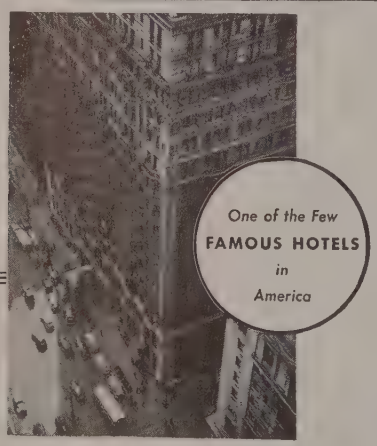


ALL METAL • FORGED STEEL
NO WELDED PARTS

OIL TIGHT • FREE END FLOAT
DUST PROOF • FULLY LUBRICATED

Send for a copy of our
Flexible Coupling Handbook

POOLE FOUNDRY & MACHINE CO.
Baltimore, Md.



CLAUDE H. BENNETT
General Manager

BELLEVUE STRATFORD

IN PHILADELPHIA

where important events happen and distinguished people stop. Near shops, theatres, points of interest, transportation . . . See Philadelphia on your World's Fair trip. Rates begin at $3.85.

-The Market Week—

ar companies are starting to
steel tonnages for 1940 mod-
ggesting that purchases for
lance of runs on 1939 models
restricted.

innati — Prices are softer,
dealers reducing their bids
ts a ton on most items. Scrap
ing steadily against contracts,
offerings adequate to make
g easy. Neither mills nor
s show desire to build up
inventories.

Louis — The market is in the
ms, with no consumer buying
portance pending. Prices are
ally unchanged at levels pre-
g the past few weeks. Little
is coming in from the coun-
nd no distress material is in
arket.

ttle—Picketing by Chinese and
sympathizers is prevalent at
Northwest ports and scrap
ents are being delayed. Jap-
buyers have turned to other
es of supply and ship owners
te to send vessels here. Roll-
nills are buying considerable
ial paying $12 for No. 1 heavy
g and $11 for No. 2. Export
are about $2 higher.

onto, Ont. — Scrap demand is
but supplies are becoming
plentiful, principally automo-
material. Offerings of heavy
g steel are limited, while
s of machinery cast are light
e face of steady demand from
consumers. No. 1 cast is at
mium, some users offering 50
above the market for this

arehouse

Warehouse Prices, Page 73

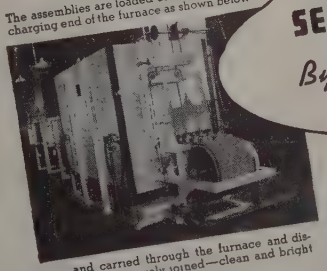
w York — Prime hot-rolled
s, 8 to 30 gage, are no longer
ded in the hot-rolled quantity
ential plan with plates, bars,
es and other products and the
for such products is readjusted
istrict jobbers to 3.25c for 2000
ds or more and 3.40c for 1999
ds or less. There is no change
e price of 3/16-inch hot sheets,
18 inches wide, this grade and
continuing in the quantity dif-
tial plan at 3.73c.

veland—Sales generally pursue
iewise course, but some ware-
es predict an upward trend
g at least part of April. March
ness varied only slightly from
uary on a daily basis.

iladelphia—March sales were
best since October, 1937, but the
ency in buying near the end of
month indicates April probably
not be comparable. Local ware-

you can join your metal parts
ECONOMICALLY, NEATLY,
SECURELY and CONTINUOUSLY
By the ELECTRIC FURNACE BRAZING METHOD

The assemblies are loaded on a conveyor at charging end of the furnace as shown below



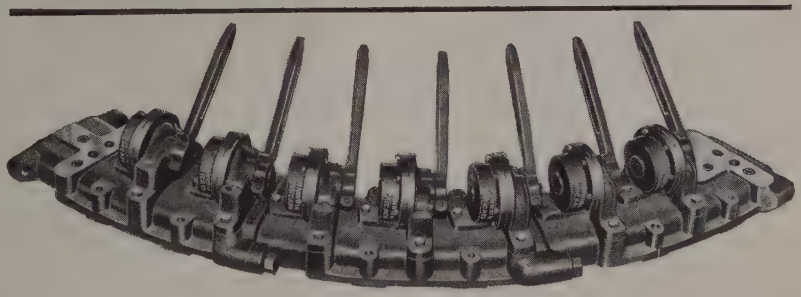
. . and carried through the furnace and discharged—securely joined—clean and bright

Intricate assemblies—large and small—are securely brazed in these furnaces. Investigate the brazing process. We will be glad to braze sample of your assemblies to show you the results you can get—also give you an estimate of installation and operating costs on furnace to handle your product and production.

Send for circular on the brazing process.

The Electric Furnace Co., Salem, Ohio

Gas Fired, Oil Fired and Electric Furnaces—For Any Process, Product or Production



• *Quick acting*

Hannifin Manifold Valves simplify control of several air or hydraulic cylinders and allow faster operation. Hannifin disc-type valve design is simple and positive. Since there is no packing there is no leakage or packing maintenance trouble.

Manifold valves are available in several types, for control of any type of air or hydraulic equipment. Also hand and foot operated, spring return, rotary, electric and special models. Write for Valve Bulletin 34-S.

HANNIFIN MANUFACTURING COMPANY

621-631 SOUTH KOLMAR AVENUE, CHICAGO, ILLINOIS

ENGINEERS • DESIGNERS • MANUFACTURERS • *Pneumatic and Hydraulic Production Tool Equipment*

HANNIFIN "Packless" AIR CONTROL VALVES

USE BISCO TUBING

DON'T WASTE

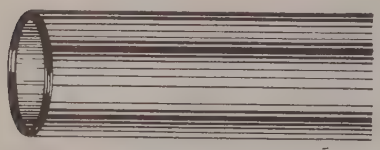
—good steel
—and labor

It's not difficult to make rings and bushings from solid steel—but it *is* wasteful.

You pay for the steel converted into chips (and the better the steel the more you pay for waste). You also pay for needless labor, power consumption, wear and tear on tools and machinery, and lots of other things. . . .

It's *quicker*, and more economical to use BISCO alloy and Tool Steel Tubing. You can get any diameter up to 14 inches. There are standard sizes for every requirement.

Send for a copy of our stock list showing sizes carried for immediate shipment.



WE FURNISH

Tubing for Aircraft
For Ball Bearings
For Mechanical Uses
For Boilers (A. S. M. E.)
Tool Steel Tubing
Alloy Tubing
Cold Drawn Tubing
Stainless Steel Tubing

THE BISSETT STEEL COMPANY
900 East 67th St.,
CLEVELAND, OHIO

ORDER FROM STOCK

houses have taken no action yet to revise hot-rolled sheets in line with the change at New York.

Chicago — Business is only steady but is regarded as fairly satisfactory. Despite absence of a definite trend, next changes are expected to be upward. Country buying continues ahead of city purchasing.

Buffalo — Although reports vary, March business as a whole was the best in about a year. Some distributors noted a falling off last month. Demand for structural items has not improved materially.

Detroit—Warehouses are awaiting release of programs for 1940 automobile models, most of which are unusually slow to become active. March business was ahead of February, but the gain was less than expected.

Cincinnati — Although individual orders are small, warehouse tonnage in March exhibits a sustained seasonal increase over the preceding month. Some jobbers estimate the gain over last year at 20 per cent. Prices are firm and unchanged.

Seattle—Volume of sales is below seasonal averages. Market is irregular, small lots predominating. Spring upturn has not yet appeared. Light sheets are probably in best demand. Prices are unchanged, well maintained in Washington, with Oregon dealers still trying to bring their price up to the Seattle level.

Iron Ore

Iron Ore Prices, Page 74

New York—Importers of Caucasian manganese ore are firming up their prices, with nominal offerings of 29 cents per unit, not including duty, on the 50 per cent grade. However, the market has not recently been tested at this level, as no important inquiries are being figured. South African manganese ore of comparable grade is also being offered now at approximately the same level. These higher offerings are regarded as reflecting the continued tense European political situation.

Other foreign ores, including iron, chrome and tungsten ores, are nominally unchanged, with too little business to provide a test.

Ferroalloys

Ferroalloy Prices, Page 72

New York—March shipments of ferromanganese were slightly ahead of February, due primarily to the longer month. A further small gain is expected in April. Meanwhile domestic prices are unchanged, while foreign quotations are som stronger, following the withd of low offerings from wha Czecholsovakia. Recent arriv foreign ferromanganese i more than 600 tons from H Domestic spiegeleisen price unchanged, with shipments s

Steel in Europe

Foreign Steel Prices, Page 73

London — (*By Cable*) — Pi output is increasing in Great ain as a result of heavy de from steelworks and two blas naces are being blown in by man, Long & Co. Ltd. The in tional situation is disturbing mal trade requirements but s lating government contracts. works are well occupied, with finished steel, sheets and light turals in most demand.

The Continent reports e trade much disturbed with ir lar demand, limited to small o A sale of Brazilian hematite ore is reported to have been for Continental delivery.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page

Bolt, nut and rivet business la during March. Specifications maintained, but new buying b held its own compared with F ary despite the longer m Structural activity has given stimulus to demand, but rai buying for repair work is a better though still light. Aut tive orders have gained lately, further improvement expecte April. Shipyard requirements fairly well sustained.

New discounts have been nounced on cap and set screws fective immediately. Single counts replace the old multiple ures and result in small incre in net prices. Similar discount cently were adopted on bolts nuts.

Brazil May Rebuild Navy from Scrap Sales

■ Funds for rebuilding the Br ian navy will be obtained from ports of iron and steel scrap if recommendation of President gas is adopted by the Brazilian eral Trade council. It is estim 1,000,000 tons of scrap is accu lated in yards, and a number of ship hulls are lying useless in s yards. President Vargas' prop is to reclaim and sell for export the scrap available for which th is no domestic outlet.

ehem Operations t in Its History

ations in 1938 were the n record for Bethlehem Steel comparative study of safety ust completed by the com- safety staff reveals that few- dents per man-hour occurred steel plants, in shipbuilding, and other operations than in ar in which special accident have been kept. The month- age number of workers last as 82,680.

1916 when the program of t prevention was instituted ts have been reduced by 80 t. Last year showed a reduc- accidents of 10 per cent as ed with 1937. During the e years which represent 672,- man-hours of employment, dy indicates accidents have educed by one half.

of the features of last year's was the operation of the ia plant, Johnstown, Pa., for y period, representing 3,217,- an-hours, without a lost-time t.

nother plant where a study dents was made in conjunc- th the company's employe re- n it developed that accidents curred outside the plant and that entitled the employes to relief payments were nearly three times more numerous than the "lost-time" accidents that took place in the plant. Automobiles took the heaviest toll among accidents that occurred outside the plant, with falls on sidewalks and streets ranking second, and falls in the home third.

A feature of safety promotion is to direct attention each month to some specific type of hazard.

Emphasis this year is placed on perfection of physical safeguards, such as making plant layouts safer, or the remedying of unsafe conditions from such causes as improper lighting, dress or apparel, or defective equipment. The emphasis last year was on the personal factor that so often contributes to accidents.

In a number of instances Bethlehem first-aid teams have saved the lives of employes who were in serious accidents, inside and outside the plant.

Nonferrous Metals

New York — Despite disturbing European political developments sentiment in nonferrous metal markets at the end of the first quarter was generally optimistic. Moderate gains in consumption during the first three months (amounting to

Nonferrous Metal Prices

Spot unless otherwise specified. Cents per pound

ectro, del. onn.	Copper Lake, del. Midwest	Casting, refinery	Straits Tin, New York Spot	Straits Tin, New York Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
.25	11.37½	10.40	46.65	46.60	4.85	4.70	4.50	20.00	11.25	35.00
.25	11.37½	10.37½	46.70	46.60	4.85	4.70	4.50	20.00	11.25	35.00
.25	11.37½	10.37½	46.47½	46.40	4.85	4.70	4.50	20.00	11.25	35.00
.25	11.37½	10.37½	46.62½	46.50	4.85	4.70	4.50	20.00	11.25	35.00
.25	11.37½	10.25	46.50	46.40	4.85	4.70	4.50	20.00	11.50	35.00
.25	11.37½	10.17½	46.50	46.40	4.85	4.70	4.50	20.00	11.50	35.00

PRODUCTS

Mill base, cents per lb. except as noted. Copper brass products based on 11.25c Conn. copper

Sheets

brass (high) 17.31
hot rolled 19.37½
ut to jobbers 8.00
00 lb. base 9.75

Tubes

ellow brass 20.06
ss copper 19.87½

Rods

ellow brass 12.62
hot rolled 15.87½

Anodes

untrimmed 16.62½

Wire

brass (high) 17.56

METALS

Nom. Del. Buying Prices

No. 1 Composition Red Brass

ork 6.37½-6.62½
nd 7.25-7.50
..... 6.62½-6.87½
is 6.25-6.50

Heavy Copper and Wire

ork, No. 1 ..... 8.37½-8.50
nd, No. 1 ..... 8.25-8.50
Chicago, No. 1 ..... 8.25-8.50
St. Louis 8.25-8.50

Composition Brass Borings

New York 5.62½-5.87½

Light Copper

New York 6.87½-7.12½
Cleveland 6.50-6.75
Chicago 6.62½-6.87½
St. Louis 6.50-6.75

Light Brass

Cleveland 4.25-4.50
Chicago 4.12½-4.37½
St. Louis 3.75-4.00

Lead

New York 4.10-4.35
Cleveland 3.50-3.75
Chicago 3.60-3.85
St. Louis 3.25-3.50

Zinc

New York 2.50-2.62½
Cleveland 2.00-2.25
St. Louis 2.00-2.25

Aluminum

Borings, Cleveland 6.25-6.50
Mixed, cast, Cleveland 7.75-8.00
Clips, soft, Cleveland 14.75-15.00
Mixed cast, St. Louis 7.75-8.25

SECONDARY METALS

Brass ingot, 85-5-5-5, less carloads .. 11.00
Standard No. 12 aluminum 12.50-13.00

USE
MOORE RAPID
Lectromelt
FURNACES
for
MELTING
REFINING
SMELTING

Alloy and Carbon Steels.
Gray and Malleable Irons.
Copper, Nickel and Alloys.
Ferro-Alloys, Carbide.
Special Products.

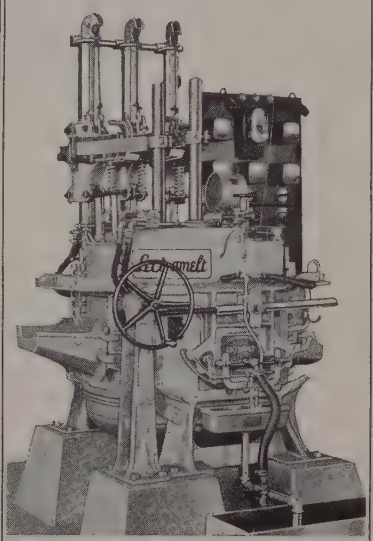


Illustration shows new 500 pound capacity 3 phase direct arc LECTROMELT furnace installed in jobbing steel foundry.

RAPID
ECONOMICAL
RUGGED

BUILT IN STANDARD SIZES
25 LBS. TO 50 TONS CAPACITY

PITTSBURGH
LECTROMELT
FURNACE
CORP.
PITTSBURGH, PA.

20 points in tin plate operations, 10 points in galvanized sheet output, and 10 points in copper and brass mill operations) and a strengthening in price structures were among the favorable factors. The future trend depends greatly on how stable the foreign situation will be.

Copper—First-hand sellers' sales increased as less interest was shown in resale due to higher levels quoted in the outside market. Export copper held steady at 10.25c to 10.35c, c.i.f. while producers continued to quote electrolytic here at 11.25c, Connecticut.

Lead—Consumers' nearby requirements are well covered so purchases last week were confined mostly to fill-in tonnages. Prices held at 4.70c, East St. Louis, and 4.85c, New York.

Zinc—A rise of $1 per ton in zinc ore prices worsened the unfavorable price position from a producers' view of the primary zinc m An advance here from the 4.5 East St. Louis level is prevent the depressing effect of the lov don market.

Tin—Straits spot prices fluc between 46.47½c to 46.70c i with changes in London ti Wall street security price t Buying was spotty with a su tial volume of business book a few days.

Antimony — American anti prices advanced ¼-cent on 7 day to the basis of 11.50c, York, for spot and 11.25c, shi in bulk from smelter. Chines held nominally unchanged at duty paid New York.

Lewis B. Lindemuth

Consulting Engineer

134 East 47th Street

NEW YORK, N. Y.

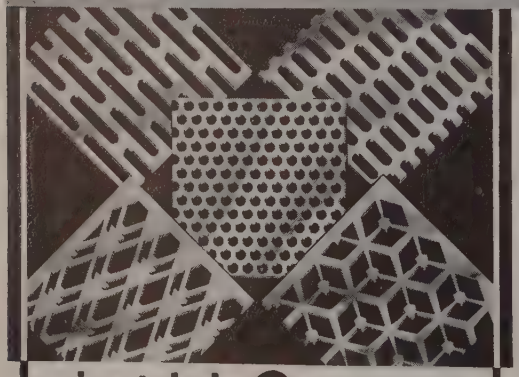
■

STEEL PRODUCTION

DESIGN • OPERATION • CONSTRUCTION

METALLURGY • UTILIZATION OF SPECIAL ORES

PERFORATED METALS



Industrial - Ornamental

ANY METAL ANY PERFORATION

INDUSTRIAL—Whether your screening problems include very coarse or extremely fine materials, you will obtain the best results with perforated metal. H & K screens have increasingly served in all fields of industry for many years and established an unequaled standard in lasting performance. Regardless of size, metal or perforation, permit us to discuss your requirements with you.

ORNAMENTAL—Beauty of ornamental grilles depend largely on the experience of the designer and producer. Experience has built a complete assortment of H & K ornamental grilles that will satisfy your wants in both design and price.

Write us for further information.

The Harrington & King PERFORATING Co.

5634 FILLMORE ST., CHICAGO 114 LIBERTY ST., NEW YORK

Equipment

New York—Harnischfeger Milwaukee, appears low on mo not all, of 38 electric overhead eling bridge cranes for install at navy yards, Boston, New Philadelphia, Charleston, No Mare Island and Puget Sound. firm bid $498,932, March 29, t quiry being the largest bridge inquiry in recent years. How specifications include several nates for part of the work only final awards may be distri among several builders. Crane from 25 to 175-ton capacity.

Chicago—March sales of h equipment were reported the b over a year by a leading int General demand for machine has been good, although a s spottiness, believed only tempo developed the last few day March. April outlook is good, inquiries active, and much pending. Chicago sales have proved recently, although still b country orders from neighb towns and states. Agricultura mand is expected to increase s ly. Railroad requirements hav creased in some quarters.

Seattle—Mining machinery better demand but cannery equipment is not being place operators are unable to plan son's program while labor dis continue. Electrical items are ing well and automotive equip is also active. Bonneville aut ty, Portland, Oreg., has called April 17 for 23-KV oil circuit b ers for Raymond substation; 3 for 12 transformers for Am station, Spec. 224; April 10 for structing building and equipn Eugene station; April 8 for hardware, metering outfits; M 31 for 33,000 feet of wrought pipe, pipe cutters and other e ment.

nstruction and Enterprise

York

ENCE CENTER, N. Y.—National Co., Buffalo, plans to construct addition here at estimated cost oximately $40,000.

YORK—Bee-Ess Iron Works Inc. en organized with a capital of to deal in iron products. B. Rob- Warren street, New York, repre- .

YORK—Safeway Steel Scaffolds Corp. has been formed with capital to manufacture steel lad- aterial hoists and hod hoists. Byrne, 551 Fifth avenue, New s company's representative.

ERTOWN, N. Y.—Central New ower Corp. plans to extend its facilities in four counties at $1,326,000. Project includes con- n of an electric power plant rchase of new equipment. R. W. vice president, in charge.

cticut

LONDON, CONN.—City is pre- plans for construction of a sew- posal plant costing about $600,000 Trumbull. Solomon & Keis, Troy, consulting engineers.

T HARTFORD, CONN.—Pratt & y division of Niles-Bement-Pond . R. Burt, president, Hartford, has let general contract for con- ng a one-story, 520 x 960-foot, vo-story, 150 x 250-foot machine hop costing nearly $3,000,000, to Stewart Co., 230 Park avenue, ork.

achusetts

LASTON, MASS.—Howard John- o. has plans underway for con- ng a 100 x 100-foot plant addi- stimated to cost approximately 0.

Jersey

ANTIC CITY, N. J.—Atlantic City c Co. proposes to make exten- n its steam electric power plant, ng installation of considerable quipment.

sylvania

X, PA.—U. S. Fibre Box Co., H. J. Sr., president, Indianapolis, pro- to build a one-story factory build- sting $40,000.

CINNATI—City, C. O. Sherrill, city ger, plans to make improvements in terworks at cost of $12,000.

LIPOLIS, O.—Buckeye Rural Elec- sociation, O. E. Elliott, president, een allotted a $154,000 loan by for construction of 152 miles power transmission lines through unties.

A, O.—City, A. L. Metheany, mayor, to double capacity of its water oir and erect two water tanks at $468,000. Will mature about July. s Quinn, city engineer.

RTHFIELD, O.—State welfare de- ent, Charles Sherwood, director, bus, O., will advertise soon for bids ew boiler, three stokers and a 400- ower engine and generator costing f $100,000. R. G. Ingleson, Colum- onsulting engineer.

igan

T LANSING, MICH. — Michigan college is planning to purchase a enerator and condenser, auxiliary nent, 12-feed switchboard, ash han- system, water softener and deep well pump. Total cost, $500,000.

HILLSDALE, MICH.—City is taking bids due at 7:30 p. m., April 10, on changes in its electrical equipment and distribution system, involving new switchgear, transformers, etc. Hamilton & Weeber, Grand Rapids, Mich., consulting engineer.

Illinois

CHICAGO—Mackray Metal Mfg. Co. has incorporated with 100 shares no par value common stock to deal in metals. Correspondents, Burry, Johnston, Peters & Dixon, 105 South LaSalle street, Chicago.

CHICAGO—Olive Can Co. has awarded contract to Stroebel & Hall, 192 North Clark street, Chicago, for constructing a one-story, 60 x 100-foot factory costing an estimated $40,000.

CICERO, ILL.—Kropp Forge Co. will soon take bids on construction of a proposed one-story, 80 x 200-foot forging plant costing about $40,000. Meyer & Cook, Cicero, architects.

Indiana

BREMEN, IND.—Bremen Gray Iron Foundry Inc. has been formed by Harold S. Heckman, C. W. Kling and Ellis Brown, Bremen, with capital of $15,000, to operate a foundry.

INDIANAPOLIS—Wheel Equipment Co. Inc., 2821 Roosevelt avenue, Indianapolis, has been organized with 100 shares no par value capital stock to manufacture steel wheels and allied equipment. George S. Humes, B. E. Rader and C. L. Rader, Indianapolis, incorporators.

INDIANAPOLIS — Radio Corp. of America, H. E. Le Roy, local manager, 501 North LaSalle street, has awarded general contract for constructing a one-story, 285 x 358-foot assembly plant and power house costing about $250,000, to J. L. Simmons & Co. Inc., Union Title building, Indianapolis.

South Carolina

GREENVILLE, S. C.—Greater Greenville sewer district commission asks bids until April 14 on construction of a sewage disposal plant costing $829,000. J. E. Sirrine & Co., Greenville, consulting engineers.

Oklahoma

VINITA, OKLA.—Grand River dam authority, O. Butler, secretary, takes bids until April 11 for constructing a 300,000-gallon per day sand filter plant and pumping station at cost of $59,850. Holway & Neuffer, Tulsa, Okla., consulting engineers.

Missouri

KIRKWOOD, MO.—City, A. S. Kinyon, mayor, receives bids April 21 for constructing an electric substation and whiteway. Black & Veatch, Kansas City, Mo., consulting engineers. (Noted Dec. 19.)

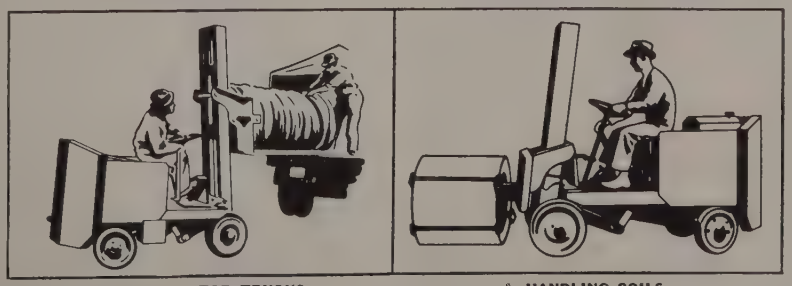
ROCKPORT, MO.—Atchison-Holt Electric co-operative, W. C. Scamman, president, has awarded contract to the Schneider Electric Co., Omaha, Nebr., at $98,327, for the construction of approximately 138 miles of rural electric power lines in five counties. H. H. Henningson Engineering Co., Omaha, Nebr., consulting engineer. (Noted March 20.)

ST. LOUIS—Mines Equipment Co., J. B.

TOWMOTORS CLEVELAND

HANDLE MOST ANY SHAPE OR SIZE PACKAGE

HANDLING BUNDLES — LOADING STRAPPED MATERIALS



LOADING MOTOR TRUCKS — HANDLING COILS

With TOWMOTOR Lift Trucks you need not be fussy about the shapes of your incoming packages. They handle most any shape or size that is best suited to your own layout. Coils, bundles, crates, strapped material, rolls or pallet loads—all are handled faster, safer and at lower cost with TOWMOTORS. Pioneers for 20 years in seated center control and straight gas power. Write for new book of action pictures today.

TOWMOTOR CO., 1247 East 152nd St., Cleveland, Ohio

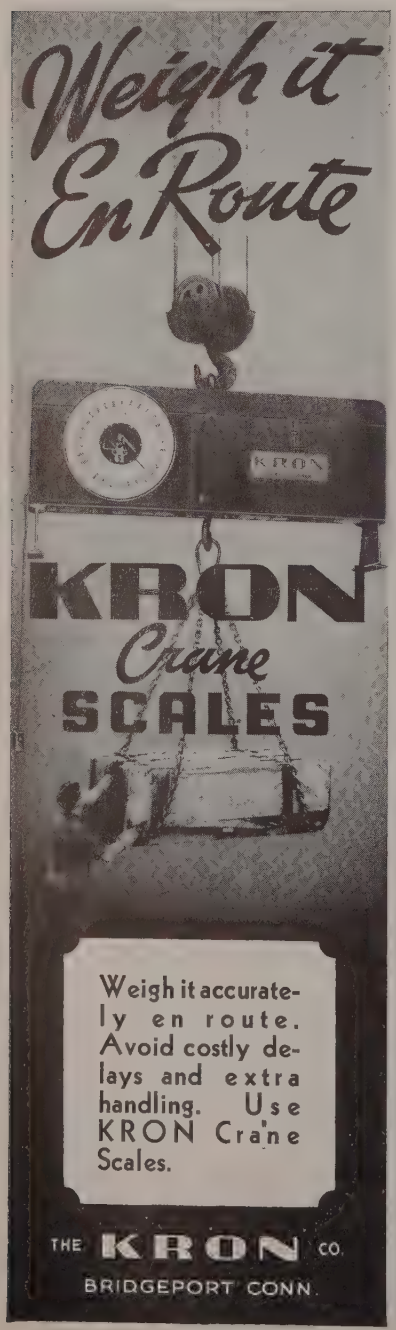
New York Office: 92 Liberty St., Phone: REctor 2-3977 Sales Offices in 22 Principal Cities

Miller, president, manufacturer of mining equipment and supplies, is taking bids on general contract for constructing a one-story plant addition, 9975 square feet, and improving present building. Total cost of construction and new equipment estimated at $50,000.

Wisconsin

MANITOWOC, WIS.—Kieckhefer Container Corp., John W. Kieckhefer, president, Milwaukee, manufacturer of corrugated boxes, will begin construction about May 1 of a new 70,000-square foot factory here.

PLATTEVILLE, WIS.—Tri-state Power co-operative, E. J. Stoneham, president, plans to construct a steam generating plant costing $500,000. E. A. Taylor, St. Louis, consulting engineer.



Minnesota

MANKATO, MINN.—Blue Earth Nicollet Co-operative Electric association, Fred Weaver, secretary, is taking bids until 2 p.m., April 10, on the construction of about 300 miles of rural transmission lines in nine counties. Certified check 5 per cent to accompany bids. Ellerbe & Co., St. Paul, consulting engineers.

SPRINGFIELD, MINN.—City, A. C. Mueller, clerk, is receiving bids until 7:30 p.m., April 12, on boiler, stoker, turbine, condenser and crane for its power plant. Charles Foster, Duluth, engineer.

Texas

ALICE, TEX.—City plans to construct a sewage disposal plant and has voted to issue $15,000 bonds to finance project.

AUSTIN, TEX.—Lower Colorado River authority, Fritz Englehard, chairman of board of directors, 806 Littlefield building, receives bids April 28 for turbines, governors and generators for power plant at Marshall Ford dam.

PALESTINE, TEX. — Tidewater and Seaboard Oil companies have awarded joint contract to J. F. Pritchard & Co., Kansas City, Mo., for constructing a gasoline processing and recycling plant at cost of about $300,000.

Iowa

HARTLEY, IOWA — Village, Gwen Guenther, clerk, is taking bids to 2 p.m., April 25, on a 450-horsepower diesel engine for installation in its power plant. Certified check 5 per cent on Iowa bank to accompany bid.

SIOUX CITY, IOWA—Woodbury County Rural Electric co-operative, C. L. Brown, president, will take bids this month on construction of 119 miles of rural electric transmission lines. Buell & Winter Engineering Co., Sioux City, consultant. (Noted March 6.)

VILLISCA, IOWA—Municipal power plant trustees, C. G. Hilleary, secretary, takes bids until 10 a.m., April 18, on diesel generator units and auxiliary equipment, switchboard, new heating system, etc., for its plant. A. S. Harrington, Omaha, Nebr., engineer. (Noted March 20.)

Montana

TWIN BRIDGES, MONT.—REA has allotted $94,000 to Jefferson Valley Rural Electric co-operative, William Heaston, superintendent, to finance construction of 80 miles of rural electric transmission lines in three counties. J. M. Garrison, state water conservation board, Helena, Mont., consulting engineer.

Idaho

BOISE, IDAHO—Forestry service plans to build a machine shop for civilian conservation corps. Will include warehouse, gas and oil storage, heating plant and machinery.

Pacific Coast

BRIGHTWOOD, OREG.—Mt. Hood water district, E. G. Chaplin, commissioner, plans to construct a water system costing $125,000. Bond issue is to supplement WPA funds.

PORTLAND, OREG.—Bonneville power project, 811 Northeast Oregon street, asks bids until April 17 for two 23-kilovolt oil circuit breakers for substation use. (Bid 217.)

SEATTLE—J. R. Sousa and Gerald T. Mason, beverage distributors, plan to install motors and controls, c ors and other equipment in consti a bottling plant to cost about $2 W. J. Bain, Seattle, engineer.

Canada

HAMILTON, ONT.—Hamilton Mill Co. Ltd. plans to rebuild it story factory for making foundry Cost estimated at about $50,000.

MT. DENNIS, ONT.—Canadian Co. Ltd., S. B. Cornell, manage soon take bids on construction four-story, 73 x 153-foot plant sion costing approximately $40,00

QUEBEC, QUE.—City, F. X. C ard, clerk, proposes to purchase chanical filter costing $35,000 for lation in its water plant. E. city engineer.

Our aim is to render service. A little more complete . . . more hospitable . . . more pleasing . . . than even the most exacting guest expects.

CHAS. H. LOTT
Manager

Every Room Outside with Private Bath
Single from $2.50
Double from $4.00

DETROIT
LELAND
HOTEL

CASS AT BAGLEY AVE.
GARAGE IN CONNECTION

WHERE-TO-BUY

A classified list of advertisers according to products. ¶Index to advertisements gives page number of any advertiser.

IVES (Blast Cleaning)
gh Crushed Steel Co.,
St. and A. V. R. R.,
urgh, Pa.

IVES (Polishing)
Co., Taconey & Fraley Sts.,
lelphia, Pa.
ndum Co., The,
ra Falls, N. Y.
Co., Worcester, Mass.

ULATORS
n Brothers Co.,
Burleigh St., Milwaukee,

Engineering Co., The,
ce, O.
R. D., Co., 400 Chestnut St.,
delphia, Pa.

LENE
duction Sales Co.,
42nd St., New York City.
Air Products Co., The,
42nd St., New York City.
d Cylinder Gas Co.,
W. Wacker Dr., Chicago, Ill.

ROOF LININGS
lvania Salt Mfg. Co., 1000
ner Bldg., Philadelphia, Pa.
Company, Inc.,
7. 45th St., New York City.

(Pickling)
an Chemical Paint Co.,
ier, Pa.
lvania Salt Mfg. Co., 1000
ner Bldg., Philadelphia, Pa.

OMPRESSORS—See PRESSORS (Air)

ONDITIONING EQUIPMENT
ant, B. F., Co., Hyde Park,
n, Mass.
ngton Pump & Machinery
., Harrison, N. J.

LI CLEANING COMPOUNDS
lvania Salt Mfg. Co., 1000
ner Bldg., Philadelphia, Pa.

S—See FERROALLOYS

E IRON BENDERS
or Tool & Machine Co.,
e and Jefferson Aves.,
St. Louis, Ill.

ES, CHANNELS—See MS, CHANNELS, ANGLES

ALING BOXES—See BOXES (Annealing)

ES
hem Steel Co.,
lehem, Pa.
ie-Illinois Steel Corp.,
burgh-Chicago.
ia Steel Co.,
Francisco, Calif.
ic Steel Corp.,
ST, Cleveland, O.
rd Steel Works Co.,
hall P. O., Philadelphia, Pa.
see Coal, Iron & Railroad
Brown Marx Bldg.,
ingham, Ala.

ITT METAL
n, A. W., Mfg. Co.,
and Smallman Sts.,
sburgh, Pa.
al Bearing Metals Corp.,
Shore Ave., Pittsburgh, Pa.
n, Jos. T., & Son, Inc.,
and Rockwell Sts.,
ago, Ill.

NG PRESSES
an Brothers Co.,
Burleigh St., Milwaukee,

TRANSFERS
ws. Conveyer Co., 142 Tenth
Ellwood City, Pa.

BALLS (Bronze)
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

BALLS (Special Alloy Metals)
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

BAND SAWS (Metal Cutting)
Simonds Saw & Steel Co., Fitchburg, Mass.

BANDS—See HOOPS AND BANDS

BANDS (Iron and Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.

BAR BENDERS
Kardong Bros. Inc., 346 Buchanan St., Minneapolis, Minn.

BARGES (Steel)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Maryland Dry Dock Co., Baltimore, Md.

BARRELS (Steel)
Petroleum Iron Works Co., Sharon, Pa.
Pressed Steel Tank Co., Milwaukee, Wis.

BARS (Alloy)
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Firth-Sterling Steel Co., McKeesport, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
LaSalle Steel Co., P. O. Box 6800-A, Chicago, Ill.
Midvale Co., The Nicetown, Philadelphia, Pa
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Steel & Tube Co., Canton, O.

BARS (Concrete Reinforcing)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., Youngstown, O.

BARS (Iron)—See IRON (Bar)

BARS (Reinforcing)
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.

BARS (Steel)
(*Also Stainless)
*Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
*Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

BASKETS (Dipping—Hard Rubber)
American Hard Rubber Co., 11 Mercer St., New York City.

BATTERIES (Storage)
Edison, Thomas A., Inc., Orange, N. J.
Electric Storage Battery Co., The, 19th St. and Allegheny Ave., Philadelphia, Pa.

BEAMS, CHANNELS, ANGLES, ETC.
(*Also Stainless)
*Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
*Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Levinson Steel Co., The, 39 Pride St., Pittsburgh, Pa.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

BEARINGS (Ball)
Ahlberg Bearing Co., 3025 W. 47th St., Chicago, Ill.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
New Departure Div., General Motors Corp., Bristol, Conn.
Norma Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Torrington Co., The, Torrington, Conn.

BEARINGS (Bronze)
Cadman, A. W., Mfg. Co., 28th and Smallman Sts., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O

BEARINGS (Journal)
Ahlberg Bearing Co., 3025 W. 47th St., Chicago, Ill.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Division, General Motors Corp., Harrison, N. J.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Needle)
Torrington Co., The, Torrington, Conn.

BEARINGS (Oilless)
Rhoades, R. W., Metaline Co., 50 3rd St., Long Island City, N. Y.

BEARINGS (Quill)
Bantam Bearings Corp., South Bend, Ind.,

BEARINGS (Radial)
Ahlberg Bearing Co., 3025 W. 47th St., Chicago, Ill.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Div., General Motors Corp., Harrison, N. J.
New Departure Div., General Motors Corp., Bristol, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roll Neck)
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Div., General Motors Corp., Harrison, N. J.
Morgan Construction Co., Worcester, Mass.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roller)
Ahlberg Bearing Co., 3025 W. 47th St., Chicago, Ill.
Bantam Bearings Corp., South Bend, Ind.

BEARINGS (Roller) Con.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Div., General Motors Corp., Harrison, N. J.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Norma Hoffmann Bearings Corp., Stamford, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roller Tapered)
Ahlberg Bearing Co., 3025 W. 47th St., Chicago, Ill.
Bantam Bearings Corp., South Bend, Ind.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Rolling Mill)
Bantam Bearings Corp., South Bend, Ind.
Hyatt Bearings Div., General Motors Corp., Harrison, N. J.
Morgan Construction Co., Worcester, Mass.
Norma Hoffmann Bearings Corp., Stamford, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Self-Aligning Roller)
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.

BEARINGS (Thrust)
Ahlberg Bearing Co., 3025 W. 47th St., Chicago, Ill.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Norma Hoffmann Bearings Corp., Stamford, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BELTING (Metal, Conveyor, High and Low Temperature)
Cyclone Fence Co., Waukegan, Ill.

BELTING (Rubber)
Goodyear Tire & Rubber Co., Akron, O.
United States Rubber Co., 1790 Broadway, New York City.

BENDING AND STRAIGHTENING MACHINES
Alliance Machine Co., The, Alliance, O.
Cleveland Punch & Shear Works, 3917 St. Clair Ave., Cleveland, O.
Kardong Bros., Inc., 346 Buchanan St., Minneapolis, Minn.
Logeman Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Thomas Machine Mfg. Co., Pittsburgh, Pa.

BENZOIL AND TOLUOL RECOVERY PLANTS
Koppers Co., Engineering and Construction Div., Pittsburgh, Pa.
Koppers Co., The, Tar & Chemical Div., Pittsburgh, Pa.
Western Gas Div., The Koppers Co., Fort Wayne, Ind.
Wilputte Coke Oven Corp., 570 Lexington Ave., New York City.
Youngstown Sheet & Tube Co., Youngstown, O.

BILLETS (Alloys and Carbon Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Firth-Sterling Steel Co., McKeesport, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Republic Steel Corp., Dept. ST, Cleveland, O.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Steel & Tube Co., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.

BILLETS (Forging)
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Jones and Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Steel & Tube Co., Canton, O.

BILLETS AND BLOOMS (*Also Stainless)
*Alan Wood Steel Co., Conshohocken, Pa.
*Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
*Firth-Sterling Steel Co., McKeesport, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
*Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Steel & Tube Co., Canton, O.
Youngstown Sheet & Tube Co., Youngstown, O.

BINS (Storage)
Petroleum Iron Works Co., Sharon, Pa.

BLAST FURNACE CLEANING (Gas)
Research Corp., 405 Lexington Ave., New York City.
Western Precipitation Corp., 1016 W. 9th St., Los Angeles, Calif.

BLAST FURNACE SPECIALTIES
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brassert, H. A., & Co., 310 S. Michigan Ave., Chicago, Ill.
Brosius, Edgar E., Inc., Sharpsburg, Pa.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.

BLAST FURNACES—See FURNACES (Blast)

BLOCKS (Chain)
Ford Chain Block Co., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

BLOWPIPES (Hand and Stand)
American Gas Furnace Co., Elizabeth, N. J.

BLOWERS
American Gas Furnace Co., Elizabeth, N. J.
General Electric Co., Schenectady, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York City.
Stewart Furnace Div., Chicago Flexible Shaft Co., 1106 So. Central Ave., Chicago, Ill.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

BLOWPIPES (Air—Gas)
American Gas Furnace Co., Elizabeth, N. J.

BLOWPIPES (Oxy-Acetylene)
Linde Air Products Co., The, 30 E. 42nd St., New York City.

BOILER HEADS
Bethlehem Steel Co., Bethlehem, Pa.

BOILER TUBES—See TUBES (Boiler)

BOILERS
Babcock & Wilcox Co., 19 Rector St., New York City.
Oil Well Supply Co., Dallas, Texas.

BOLT AND NUT MACHINERY
Landis Machine Co., Inc., Waynesboro, Pa.

BOLTS (*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland Cap Screw Co., 2935 E. 79th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Ohio Nut & Bolt Co., The, 600 Front St., Berea, O.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

BOLTS (Carriage and Machine)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2935 E. 79th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.

BOLTS (Special)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2935 E. 79th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS (Stove)
Cleveland Cap Screw Co., 2935 E. 79th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

BOLTS (Stove, Recessed Head)
American Screw Co., Providence, R. I.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, Cleveland, O.
National Screw & Mfg. Co., Cleveland, O.
Pheoll Mfg. Co., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Waterbury, Conn.

BOLTS (Track)—See TRACK BOLTS

BORING MACHINES (Precision)
Heald Machine Co., Worcester, Mass.

BOXES (Annealing)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Petroleum Iron Works Co., Sharon, Pa.
Union Steel Casting Co., 62nd & Butler Sts., Pittsburgh, Pa.
United Engineering & Foundry Co., First National Bank Bldg., Pittsburgh, Pa.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

BOXES (Case Hardening)
Driver-Harris Co., Harrison, N. J.

BOXES (Open Hearth Char
Carnegie-Illinois Steel Corp Pittsburgh-Chicago.
Continental Roll & Steel Fo E. Chicago, Ind.
Morgan Engineering Co., Alliance, O.
Petroleum Iron Works Co., Sharon, Pa.

BRAKE LININGS
Wagner Electric Corp., 4904 Baum Blvd., Pittsbu

BRAKES (Electric)
Clark Controller Co., The, 1146 E. 152nd St., Clevel
Electric Controller & Mfg. 2698 E. 79th St., Clevela

BRAKES (Hydraulic)
Wagner Electric Corp., 4904 Baum Blvd., Pittsbu

BRAKES (Magnetic)
Stearns Magnetic Mfg. Co. 650 So. 28th St., Milwauk

BRAKES (Press)
Cincinnati Shaper Co., Elam Garrard Sts., Cincinnati.

BRAZING EQUIPMENT
American Gas Furnace Co. Elizabeth, N. J.

BRICK—(Insulating)—See INSULATING BRICK

BRICK (Refractory)—See REFRACTORIES, CEMEN ETC.

BRICK (Acid Resisting)
Keagler Brick Co., 1443 W. St., Steubenville, O.

BRICK (Silicon Carbide)
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Ma

BRIDGE CRANES (Ore and Handling)—See CRANES

BRIDGES, BUILDINGS, VIADUCTS, STACKS, ET
American Bridge Co., Frick Bldg., Pittsburgh, P
Babcock & Wilcox Co., 19 Rector St., New York
Belmont Iron Works, 22nd St., and Washington Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Blaw-Knox Co., Blawnox, P
Columbia Steel Co., San Francisco, Calif.
Petroleum Iron Works Co., Sharon, Pa.

BROACHING MACHINES
Bullard Co., The, Bridgeport,
Cincinnati Milling Machine C Oakley Sta., Cincinnati, O

BUCKETS (Clam Shell, Drag Grab, Single Line)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Clevela
Blaw-Knox Co., Blawnox, P
Cullen-Friestedt Co., 1308 Kilbourn Ave., Chicag
Harnischfeger Corp., 4411 W tional Ave., Milwaukee, Wi
Industrial Brownhoist Corp., Bay City, Mich.

BUCKETS (Single Hook, Auto Dump, Automatic Single Lin
Brosius, Edgar E., Inc., Sharpsburg, Pa.

BUILDINGS (Steel)—See BRIDGES, BUILDINGS, E

BULLDOZERS
Beatty Machine & Mfg. Co., Hammond, Ind.
Logeman Brothers Co., 3126 Burleigh St., Milwauk Wis.

BUNGS (Rubber)
Rhoades, R. W., Metaline Co., 50 Third St., Long Island City, N. Y.

BURNERS (Acetylene)—See TORCHES AND BURNER

BURNERS (Automatic)
American Gas Furnace Co., Elizabeth, N. J.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore
Pennsylvania Industrial Engin 2413 W. Magnolia St., Pittsburgh, Pa.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O

THE PURE

E THREE POINT LUBRICATION
nplete Line of Industrial Petroleum Lubricants

THREE PURE

Ask a Pure Oil Engineer to help solve your lubrication problems

OIL CO.
CHICAGO U.S.A.

Simonds makes quality gears of all kinds—SPUR—BEVEL—MITRE & WORM—RACK CUT TEETH. *Distributors for* Ramsey Silent Chain Drives—Gates Vulco Rope Drives. *Also:* All Steel Silent Pinions—Bakelite Silent Pinions.

Drop us an inquiry.

THE SIMONDS GEAR & MFG. CO.
25th Street, Pittsburgh

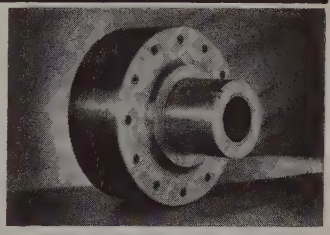
HILLIARD CLUTCHES

THE HILLIARD OVER-RUNNING CLUTCH...

Four important functions:

—automatic dual drive operation of any equipment with any type of prime movers
—automatic operation of 2-speed drive
—as a ratchet, permitting infinite adjustment
—as an automatic back-stop

Write for booklet giving full information



THERE'S A HILLIARD CLUTCH FOR EVERY JOB
OVER-RUNNING...FRICTION...SINGLE REVOLUTION...SLIP...SPECIAL

THE HILLIARD CORPORATION
111 WEST 4TH ST. ELMIRA, N. Y.

HAGAN

INDUSTRIAL FURNACES
for all purposes
GEORGE J. HAGAN CO.
PITTSBURGH, PA.
Detroit Chicago San Francisco

INDUSTRIAL FURNACES HAGAN FOR ALL PURPOSES

DUSTRIAL FURNACES
OVENS and DRYERS
BURNER EQUIPMENT
ENNSYLVANIA INDUSTRIAL ENGINEERS
2413 W. Magnolia St., N. S., Pittsburgh, Pa.

STEWART
INDUSTRIAL
FURNACES OF ALL KINDS
Chicago Flexible Shaft Co., 1106 S. Central Ave., Chicago, U. S. A.
Canada Factory: 321 Weston Rd., S., Toronto • New York Office: 11 W. 42nd St., N. Y.

IGNING AND COMBUSTION ENGINEERS
SPECIALIZING IN
PEN HEARTH FURNACES
FTUS ENGINEERING
LIVER BLDG. BURGH, PA.
Corporation
TELEPHONE ATLANTIC 4480

Regeneration Experts

EUREKA FIRE BRICK WORKS
1100 B. F. Jones Law Bldg. PITTSBURGH, PA. AT 0642-0643
Patent Covered Hot Tops and Bottom Plugs for Ingot Molds for Alloy Steels
High Grade Clay and Fire Brick for Furnaces, Boilers, Cupolas, Coke Ovens, etc. Edge Pressed Brick for accurate sizing.
Difficult Shapes a Specialty
Works: Mt. Braddock, Fayette Co., Pa. Dunbar, Pa.—2581

Wire-Working Machinery
Wire Mill Equipment

Sleeper & Hartley, Inc.
Designers and Builders
Worcester, Massachusetts

BURNERS (Fuel, Oil, Gas, Combination)
American Gas Furnace Co., Elizabeth, N. J.
Babcock & Wilcox Co., 19 Rector St., New York City.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Stewart Furnace Div., Chicago Flexible Shaft Co., 1106 So. Central Ave., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

BUSHINGS (Bronze)
Cadman, A. W., Mfg. Co., 28th and Smallman Sts., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.

BUSHINGS (Oilless)
Rhoades, R. W., Metaline Co., 50 3rd St., Long Island City, N. Y.

BUSINESS CARDS (Engraved)
Modern Card Co., 1153 Fullerton Ave., Chicago, Ill.

BY-PRODUCT PLANTS
Koppers Co., Engineering and Construction Div., Pittsburgh, Pa.
Wilputte Coke Oven Corp., 570 Lexington Ave., New York City.

CALCIUM METAL AND ALLOYS
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

CAP SCREWS—See SCREWS (Cap, Set, Safety-Set)

CAR DUMPERS
Alliance Machine Co., The, Alliance, O.
Industrial Brownhoist Corp., Bay City, Mich.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CAR PULLERS and SPOTTERS
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Cullen-Friestedt Co., 1308 Kilbourn Ave., Chicago, Ill.
Link-Belt Co., 2410 W. 18th St., Chicago, Ill.

CARBIDE
Linde Air Products Co., The 30 E. 42nd St., New York City.
National Carbide Corp., 60 E. 42nd St., New York City.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago, Ill.
Shawinigan Products Corp., Empire State Bldg., New York City.

CARBURIZERS
Houghton, E. F. & Co., 240 W. Somerset St., Philadelphia, Pa.

CARS (Charging)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.

CARS (Industrial and Mining)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Petroleum Iron Works Co., Sharon, Pa.

CARS (Scale)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

CASTINGS (Acid Resisting)
Cadman, A. W., Mfg. Co., 28th and Smallman Sts., Pittsburgh, Pa.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 344 Vulcan St., Buffalo, N. Y.
International Nickel Co., Inc., The, 67 Wall St., New York City.
Meehanite Metal Corp., Pittsburgh, Pa.
National Alloy Steel Co., Blawnox, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.

CASTINGS (Alloy Steel)
Babcock & Wilcox Co., 19 Rector St., New York City.
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Damascus Steel Casting Co., New Brighton, Pa.
Ohio Steel Fdry. Co., Lima, O.
Pittsburgh Rolls Corp., 41st and Willow Sts., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell St., Chicago, Ill.
Union Steel Casting Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Brass, Bronze, Copper, Aluminum)
Bartlett-Hayward Div., The Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Cadman, A. W., Mfg. Co., 28th and Smallman Sts., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.

CASTINGS (Electric Steel)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Damascus Steel Casting Co., New Brighton, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 344 Vulcan St., Buffalo, N. Y.
National-Erie Corp., Erie, Pa.
West Steel Casting Co., 805 E. 70th St., Cleveland, O.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Gray Iron, Alloy, or Semi-Steel)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Bartlett-Hayward Div., The Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Columbia Steel Co., San Francisco, Calif.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 344 Vulcan St., Buffalo, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Oil Well Supply Co., Dallas, Texas.
Shenango Penn Mold Co., Dover, O.
Western Gas Div., The Koppers Co., Fort Wayne, Ind.

CASTINGS (Heat Resisting)
Driver-Harris Co., Harrison, N. J.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 344 Vulcan St., Buffalo, N. Y.
National Alloy Steel Co., Blawnox, Pa.
Shenango Penn Mold Co., Dover, O.

CASTINGS (Malleable)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Erie Malleable Iron Co., W. 12th & Cherry Sts., Erie, Pa.
Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.
Peoria Malleable Castings Co., Peoria, Ill.

CASTINGS (Manganese Steel)
Damascus Steel Casting Co., New Brighton, Pa.

CASTINGS (Steel) (*Also Stainless)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Damascus Steel Casting Co., New Brighton, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 344 Vulcan St., Buffalo, N. Y.
Koppers Co., Western Gas Div., Fort Wayne, Ind.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
National-Erie Corp., Erie, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O.
Oil Well Supply Co., Dallas, Texas.
Pittsburgh Rolls Corp., 41st and Willow Sts., Pittsburgh, Pa.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.
Steel Founders' Society of America, 920 Midland Bldg., Cleveland, O.
Strong Steel Fdy. Co., Hertel & Norris Ave., Buffalo, N. Y.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Union Steel Casting Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
West Steel Casting Co., 805 E. 70th St., Cleveland, O.

CASTINGS (Wear Resisting)
Meehanite Metal Corp., Pittsburgh, Pa.
Shenango Penn Mold Co., Dover, O.

CASTINGS (Worm and Gear Bronze)
Cadman, A. W., Mfg. Co., 28th and Smallman Sts., Pittsburgh, Pa.

CEMENT (Acid Proof)
Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia, Pa.
Quigley Company, Inc., 56 W. 45th St., New York City.

CEMENT (High Temperature)
Carborundum Co., The, Perth Amboy, N. J.
Norton Company, Worcester, Mass.
Quigley Company, Inc., 56 W. 45th St., New York City.

CEMENT (Refractory, High Temperature)
Johns-Manville Corp., 22 E. 40th St., New York City.
Quigley Company, Inc., 56 W. 45th St., New York City.

CENTRAL STATION EQUIPMENT
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

CHAIN (Draw Bench)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CHAIN (Malleable)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Roller)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.

CHAIN (Sprocket)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Peoria Malleable Castings Co., Peoria, Ill.

CHAIN (Steel-Finished Roller)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.

CHAIN (Welded or Weldless)
American Chain & Cable Co., Bridgeport, Conn.

CHARGING MACHINES
Atlas Car & Mfg. Co., The 1140 Ivanhoe Rd., Cleve
Morgan Engineering Co., Alliance, O.

CHARGING MACHINES (Hearth)
Morgan Engineering Co., T Alliance, O.

CHARGING MACHINES MANIPULATORS (Auto Type)
Brosius, Edgar E., Inc., Sharpsburg, Pa.

CHECKER BRICK
Loftus Engineering Corp., 509 Oliver Bldg., Pittsbu

CHEMICALS (Industrial)
American Solder & Flux C Wayne Bldg., Philadelphi

CHROME ORE
Samuel, Frank, & Co., Inc Harrison Bldg., Philadelp

CHROMIUM METAL AND ALLOYS
Electro Metallurgical Sales 30 E. 42nd St., New Yo

CHUCKS (Automatic Closin
Tomkins-Johnson Co., 611 Mechanics St., Jackson,

CLEANING SPECIALTIES
American Chemical Paint C Ambler, Pa.
Pennsylvania Salt Mfg. C Widener Bldg., Philadelp
Quigley Company, Inc., 56 W. 45th St., New Yo

CLUTCH-BRAKES (Magne
Stearns Magnetic Mfg. Co., 650 So. 28th St., Milwauk

CLUTCHES (Friction)
Jones, W. A., Fdry. & Ma 4401 W. Roosevelt Rd., Chicago, Ill.
Link-Belt Co., 300 W. Pershi Chicago, Ill.

CLUTCHES (Friction, Overr Single Revolution)
Hilliard Corp., The, 100 W. 4th St., Elmira, N

CLUTCHES (Magnetic)
Dings Magnetic Separator C 675 Smith St., Milwaukee,
Stearns Magnetic Mfg. Co., 650 So. 28th St., Milwauke

COAL OR COKE
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland-Cliffs Iron Co., Commerce Bldg., Clevelan
Columbia Steel Co., San Francisco, Calif.
Koppers Co., The, Gas & Div., Pittsburgh, Pa.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Koppers Coal Co., Koppers Bldg., Pittsburg
New England Coal & Coke Boston, Mass.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, P
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, P
Tennessee Coal, Iron & Rail Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube C Youngstown, O.

COAL, COKE, ORE AND A HANDLING MACHINERY
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Clevela
Hagan, Geo. J., Co., 2400 Carson St., Pittsburgh, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Koppers Co., Engineering & struction Div., Pittsburgh,
Koppers-Rheolaveur Co., Pittsburgh, Pa.
Link-Belt Co., 300 W. Pershin Chicago, Ill .

COKE—See COAL OR COKE

COKE OVEN MACHINERY
Alliance Machine Co., The, Alliance, O.
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Clevelar
Morgan Engineering Co., Th Alliance, O.
Wilputte Coke Oven Corp., 570 Lexington Ave., New York City.

WHERE-TO-BUY

VENS (By-Product)
Co., Engineering and Con-
on Div., Pittsburgh, Pa.
Coke Oven Corp.,
exington Ave.,
York City.

CREENING PLANTS
Coke Oven Corp.,
exington Ave.,
York City.

BIUM
Metallurgical Sales Corp.,
42nd St., New York City.

STION BULBS
Company, Worcester, Mass.

STION CONTROLS
Corp., 300 Ross St.,
urgh, Pa.
orp., The, 960 Eighth Ave.,
gan City, Ind.
Construction Co.,
ster, Mass.
Company, Worcester, Mass.

RATORS (Optical)
Lamson Machine Co.,
gfield, Vt.

NSATORS (Automatic)
Controller & Mfg. Co.,
E. 79th St., Cleveland, O.

ESSORS (Air)
almers Mfg. Co.,
aukee, Wis.
an Gas Furnace Co.,
beth, N. J.
Pneumatic Machinery Co.,
Kienlen Ave., St. Louis, Mo.
Electric Co.,
nectady, N. Y.
ll-Rand Co.,
roadway, New York City.
gton Pump & Compressor
, Harrison, N. J.

ETE REINFORCING BARS
BARS (Concrete
forcing)

ENSERS (Surface,
metric, Multi-Jet)
halmers Mfg. Co.,
aukee, Wis.
ll-Rand Co.,
roadway, New York City.
n Gas Div., The Koppers
Fort Wayne, Ind.
gton Pump & Machinery
., Harrison, N. J.

UITS (Electric)
e Steel Co., Arcade Bldg.,
Louis, Mo.
town Sheet & Tube Co.,
gstown, O.

UITS (Pressure-Treated
d)
Preserving Corp., The,
ers Bldg., Pittsburgh, Pa.

ECTING RODS
ity Forge Co., W. 19th and
berry Sts., Erie, Pa.
nstall Co., 47th & Hatfield
Pittsburgh, Pa.
Forge Co., 5301 W. Roose-
Blvd., Chicago, Ill.
Machine Co., P. O. Box 1466
sburgh, Pa.
al Forge & Ordnance Co.,
ne, Warren Co., Pa.
rd Steel Works Co.,
hall P. O., Philadelphia, Pa.

RACTORS—See ENGINEERS
) CONTRACTORS

ROL SYSTEMS (Automatic)
ican Gas Furnace Co.,
abeth, N. J.
Instrument Div. of Min-
polis Honeywell Regulator Co.,
Wayne Ave.,
adelphia, Pa.
ro Co., The, 118 Neponset
., Foxboro, Mass.
Corp., 300 Ross St.,
sburgh, Pa.
& Northrup Co., 4901 Stenton
., Philadelphia, Pa.

ROLLERS (Combustion)—See
MBUSTION CONTROLS

ROLLERS (Electric)
Bradley Co., 1326 So. Second
Milwaukee, Wis.
Controller Co., The,
6 E. 152nd St., Cleveland, O.
ic Controller & Mfg. Co.,
8 E. 79th St., Cleveland, O.
al Electric Co.,
enectady, N. Y.

ROLS (Temperature)
ican Gas Furnace Co.,
zabeth, N. J.
n Instrument Div. of Min-
polis Honeywell Regulator
. 4462 Wayne Ave.,
adelphia, Pa.

Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Hagan Corp., 300 Ross St., Pittsburgh, Pa.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.

CONVEYOR BELTS (High and Low Temperature)
Wickwire Spencer Steel Co., 41 E. 42nd St., New York City.

CONVEYOR BELTS (Wire)
Cyclone Fence Co., Waukegan, Ill.
Wickwire Spencer Steel Co., 41 E. 42nd St., New York City.

CONVEYORS (Apron)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Chain)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Elevating)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Magnetic)
Stearns Magnetic Mfg. Co., 650 So. 28th St., Milwaukee, Wis.

CONVEYORS (Overhead Trolley)
American MonoRail Co., The, 13107 Athens Ave., Cleveland, O.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

CONVEYORS (Roller—Power and Gravity)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

COPPER (Phosphorized)
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.

COPPERING COMPOUND
American Chemical Paint Co., Ambler, Pa.

COTTER PINS
Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spring Co., 613 Central Ave., Pontiac, Mich.

COUPLERS (Hose, Instantaneous—Air and Water)
Hunt, C. B., & Son, Salem, O.

COUPLERS (Valving, Safety—Air and Water)
Hunt, C. B., & Son, Salem, O.

COUPLINGS (Flexible)
Ajax Flexible Coupling Co., Westfield, N. Y.
Bartlett-Hayward Div., The Koppers Co., Baltimore, Md.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
344 Vulcan St., Buffalo, N. Y.
General Electric Co., Schenectady, N. Y.
Hilliard Corp., The, 100 W. 4th St., Elmira, N. Y.
Horsburgh & Scott Co., The, 5114 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1114 W. Monroe St., Chicago, Ill.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Poole Fdy. & Mach. Co., Woodberry St., Baltimore, Md.
Waldron, John, Corp., New Brunswick, N. J.

COUPLINGS (Pipe)
Bethlehem Steel Co., Bethlehem, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Oil Well Supply Co., Dallas, Texas
Republic Steel Corp., Dept ST, Cleveland, O.
Youngstown Sheet & Tube Co., Youngstown, O.

CRANES, BRIDGE (Ore and Coal Handling)
Alliance Machine Co., The, Alliance, O.
Industrial Brownhoist Corp., Bay City, Mich.

IT TAKES MORE THAN BRAWN—
TO CRACK DIFFICULT PROBLEMS
IN SPRINGMAKING
Raymond has over fifty years of reliable experience to put to work on your spring needs
RAYMOND SPRINGS
WIRE FORMS
STAMPINGS
RAYMOND MFG. CO., CORRY, PA.
DIVISION OF ASSOCIATED SPRING CORPORATION

Pickling of Iron and Steel
—By Wallace G. Imhoff

Price Postpaid $5.00

This book covers many phases of pickling room practice and construction and maintenance of pickling equipment.

THE PENTON PUBLISHING CO.
Book Department
1213 W. 3rd St. Cleveland, O.
429-S

• • • LEE • • •
SPIRAL CONVEYOR SCREWS

Made of
LOW CARBON OR STAINLESS STEEL
CAN BE WELDED TO ANY SHAFT
Spiral Capacity up to 4½" O. D.
LEE SPRING CO., INC.
30 Main Street Brooklyn, N. Y.

CRANES (Charging)
Alliance Machine Co., The, Alliance, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

CRANES (Creeper, Erection)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Ohio Locomotive Crane Co., Bucyrus, O.

CRANES (Electric)
Alliance Machine Co., The, Alliance, O.
American MonoRail Co., The, 13107 Athens Ave., Cleveland, O.
Cleveland Crane & Engineering Co., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Gantry)
Alliance Machine Co., The, Alliance, O.
Cleveland Crane & Engineering Co., Wickliffe, O.
Cullen-Friestedt Co., 1308 Kilbourn Ave., Chicago, Ill
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Ohio Locomotive Crane Co., Bucyrus, O.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

CRANES (Gasoline and Diesel)
Cullen-Friestedt Co., 1308 Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Ohio Locomotive Crane Co., Bucyrus, O.

CRANES (Hand)
American Chain & Cable Co., Bridgeport, Conn.
American MonoRail Co., The, 13107 Athens Ave., Cleveland, O.
Cleveland Crane & Engineering Co., Wickliffe, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, O.
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo
Industrial Brownhoist Corp., Bay City, Mich.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa

CRANES (Jib)
Alliance Machine Co., The, Alliance, O.
American Chain & Cable Co., Bridgeport, Conn.
American MonoRail Co., The, 13107 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Locomotive)
Cullen-Friestedt Co., 1308 Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Ohio Locomotive Crane Co., Bucyrus, O.

CRANES (Monorail)
American MonoRail Co., The, 13107 Athens Ave., Cleveland, O.
Shepard Niles Crane & Hoist Corp. Montour Falls, N. Y.

CRANK SHAFTS
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Kropp Forge Co., 5301 W. Roosevelt Blvd., Chicago, Ill.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Union Drawn Steel Co., Massillon, O.

CRUSHERS
American Pulverizer Co., 1249 Macklind Ave., St. Louis, Mo.

CRUSHERS (Ring)
American Pulverizer Co., 1249 Macklind Ave., St. Louis, Mo.

CUSHIONS (Pneumatic)
Cleveland Punch & Shear Works, 3917 St. Clair Ave., Cleveland, O.

CUTTERS (Die Sinking & End Milling)
Barber Colman Co., 150 Loomis St., Rockford, Ill.
Tomkins-Johnson Co., 611 N. Mechanics St., Jackson, Mich.

CUTTERS (Gang Slitter)
Cowles Tool Co., 2086 W. 110th St., Cleveland, O.

CUTTING AND WELDING—See WELDING

CUTTING OILS—See OILS (Cutting)

CYLINDERS (Air or Hydraulic)
American Hollow Boring Co., 1054 W. 20th St., Erie, Pa.
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Tomkins-Johnson Co., 611 N. Mechanics St., Jackson, Mich.

CYLINDERS (Pressure)
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pressed Steel Tank Co. Milwaukee, Wis.

DEGREASERS
Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia, Pa.

DIE BLOCKS
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Heppenstall Co., 47th and Hatfield Sts., Pittsburgh, Pa.
Kropp Forge Co., 5301 W. Roosevelt Blvd., Chicago, Ill.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.

DIE HEADS
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Inc., Waynesboro, Pa.

DIE-SINKING MACHINES
Cincinnati Milling Machine Co., Oakley Sta., Cincinnati, O.

DIES (Cast)
Advance Foundry Co., The, 100 Parnell Ave., Dayton, O.
Farrel-Birmingham Co., Inc., 110 Maine St., Ansonia, Conn. 344 Vulcan St., Buffalo, N. Y.

DIES (Punching, Stamping, Blanking)
Budd, Edw. G., Mfg. Co., 25th St. & Huntington Park Ave., Philadelphia, Pa.
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Niagara Machine & Tool Works, 637 Northland Ave., Buffalo, N. Y.

DOORS & SHUTTERS (Steel, Fire, and Rolling)
Kinnear Mfg. Co., 818 Field Ave., Columbus, O.

DOORS FOR COKE OVENS (Automatic Self Sealing)
Wilputte Coke Oven Corp., 570 Lexington Ave., New York City.

DRAFT GAGES (Indicating, Recording)
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

DRILL RODS—See RODS (Drill)

DRILLING MACHINES (Multiple, Heavy Duty)
Thomas Machine Mfg. Co., Pittsburgh, Pa.

DRILLING MACHINES (Radial)
Cleveland Punch & Shear Works, 3917 St. Clair Ave., Cleveland, O.
Thomas Machine Mfg. Co., Pittsburgh, Pa.

DRILLS (Portable—Pneumatic)
Ingersoll-Rand Co., 11 Broadway, New York City.

DRILLS (Twist)—See TWIST DRILLS

DRIVES (Chain)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Simonds Gear & Mfg. Co., The, 2501 Liberty St., Pittsburgh, Pa.

DRIVES (Cut Herringbone Gears)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 344 Vulcan St., Buffalo, N. Y.
Horsburgh & Scott Co., The, 5114 Hamilton Ave., Cleveland, O.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
United Engineering & F'dry. Co., First National Bank Bldg., Pittsburgh, Pa.

DRIVES (Multi-V-Belt)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

DRIVES (Reciprocating)
Ajax Flexible Coupling Co., Westfield, N. Y.

DRUMS (Magnetic)
Dings Magnetic Separator Co., 675 Smith St., Milwaukee, Wis.
Stearns Magnetic Mfg. Co., The, 650 So. 28th St., Milwaukee, Wis.

DRUMS (Steel)
Petroleum Iron Works Co., Sharon, Pa.
Pressed Steel Tank Co., Milwaukee, Wis.

DRYERS (Compressed Air)
Ruemelin Mfg. Co., 3860 N. Palmer St., Milwaukee, Wis.

DUST ARRESTING EQUIPMENT
Research Corp., 405 Lexington Ave., New York City.
Ruemelin Mfg. Co., 3860 N. Palmer St., Milwaukee, Wis.
Western Precipitation Corp., 1016 W. 9th St., Los Angeles, Calif.

ECONOMIC SERVICE
Brookmire Corp., 551 Fifth Ave., New York City.

ECONOMIZERS
Babcock & Wilcox Co., 19 Rector St., New York City.

ELECTRIC WELDING—See WELDING

ELECTRIC WIRING—See WIRE AND CABLE

ELECTRICAL EQUIPMENT
Allen-Bradley Co., 1326 So. Second St., Milwaukee, Wis.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.

ELEVATING AND CONVEYING MACHINERY—See CONVEYORS

ENGINEERS AND CONTRACTORS
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Brassert, H. A., & Co., 310 S. Michigan Ave., Chicago, Ill.
Hunt, C. H., 1213 First National Bank Bldg., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.
Wilputte Coke Oven Corp., 570 Lexington Ave., New York City.

ENGINEERS (Consulting)
Aetna-Standard Engineering Co., The, Youngstown, O.
Brassert, H. A., & Co., 310 So. Michigan Ave., Chicago, Ill.
Hunt, C. H., 1213 First National Bank Bldg., Pittsburgh, Pa.
Lindemuth, Lewis, B., 134 E. 47th St., New York City.
Loftus Engineering Corp., 509 Oliver Bldg., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

ENGINEERS, CONSULTING Products Coke Oven & Gas
Koppers Co. Engineering and Construction Div., Pittsburgh

ENGINES (Gas, Oil)
Fairbanks, Morse & Co., 600 So. Wabash Ave., Chic
Ingersoll-Rand Co., 11 Broadway, New York
Worthington Pump & Machi Corp., Harrison, N. J.

ENGINES (Steam)
Oil Well Supply Co., Dallas,

FACING MACHINES (Struct
Thomas Machine Mfg. Co., Pittsburgh, Pa.

FANS (Exhaust, Ventilating
Sturtevant, B. F., Co., Hyde Park, Boston, Mass

FANS (Portable)
Perkins, B. F., & Son, Inc., Holyoke, Mass.
Wagner Electric Corp., 4904 Baum Blvd., Pittsbur

FENCING (Wire)
American Steel & Wire Co., Rockefeller Bldg., Clevelan
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Cyclone Fence Co., Waukegan
Pittsburgh Steel Co., Grant Bldg., Pittsburgh, P
Superior Iron & Wire Works 39 Pride St., Pittsburgh, P
Tennessee Coal, Iron & Railro Brown Marx Bldg., Birmingham, Ala.

FERROALLOY (Briquets)
Electro Metallurgical Sales Co 30 E. 42nd St., New York

FERROALLOYS
Cleveland-Cliffs Iron Co., U Commerce Bldg., Cleveland
Driver-Harris Co., Harrison,
Electro-Metallurgical Sales C 30 E. 42nd St., New York
International Nickel Co., Inc. 67 Wall St., New York City
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.

FERROCHROME
Electro Metallurgical Sales Co 30 E. 42nd St., New York
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia

FERROMANGANESE
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Electro Metallurgical Sales Co 30 E. 42nd St., New York
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia.

FERROPHOSPHORUS
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia.

FERROSILICON
Electro Metallurgical Sales Co 30 E. 42nd St., New York
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia

FERROVANADIUM
Electro Metallurgical Sales Cor 30 E. 42nd St., New York

FILES AND RASPS
Simonds Saw & Steel Co., Fitchburg, Mass.

FILTER CLOTH (Asbestos)
Johns-Manville Corp., 22 E. 40th St., New York

FIRE DOORS & SHUTTERS DOORS & SHUTTERS

FIRE EXTINGUISHERS
Kidde, Walter, & Co., 140 Cedar St., New York

FLANGES (Forged Steel)
Kropp Forge Co., 5301 W. Roos Blvd., Chicago, Ill.

FLANGES (Welded Steel)
King Fifth Wheel Co., 5027 mont Ave., Philadelphia, Pa

FLOORING (Monolithic)
Johns-Manville Corp., 22 E. 40th St., New York

WHERE-TO-BUY

ING (Steel)
ood Steel Co.,
ohocken, Pa.
nox Co., Blawnox, Pa.
e-Illinois Steel Corp.,
urgh-Chicago.
a Steel Co.
rancisco, Calif.
Corp., Machinery Div.,
Bldg., Pittsburgh, Pa.
Steel Co.,
. Dearborn St., Chicago, Ill.
Steel Corp.,
ST, Cleveland, O.
, Jos. T., & Son, Inc.
& Rockwell Sts., Chicago, Ill.
Co., Dravo Bldg.,
urgh, Pa.

DUST CONDITIONERS
, Edgar E., Inc.,
sburg, Pa.
h Corp., 405 Lexington
New York City.
Precipitation Corp.,
W. 9th St.,
Angeles, Calif.

GAS ANALYZERS
Corp., The, 960 Eighth Ave.,
gan City, Ind.

SPAR
Fluor Spar Mines,
. Dearborn St., Chicago, Ill.
. Frank, & Co., Inc.,
son Bldg., Philadelphia, Pa.

S (Soldering, Welding & ng)
an Chemical Paint Co.,
er, Pa.
an Solder & Flux Co.,
Wayne Ave., Philadelphia, Pa.

NG BILLETS—See BILLETS

NG MACHINERY
e Machine Co., The,
nce, O.
oundry Co., Erie, Pa.
ial Brownhoist Corp.,
City, Mich.
Engineering Co., The,
nce, O.

NGS (Brass, Bronze, er)
an Brass Co., The,
roadway, New York City.
port Brass Co.,
report, Conn.

NGS (Drop)
o Stainless)
Drop Forge Co.,
ing, Mich.
hem Steel Co.,
ehem, Pa.
Forge Co., 5301 W. Roosevelt
, Chicago, Ill.
l Supply Co., Dallas, Texas.

NGS (Hollow Bored)
Drop Forge Co.,
ing, Mich.
an Hollow Boring Co.,
W. 20th St., Erie, Pa.
ty Forge Co., W. 19th and
berry Sts., Erie, Pa.
rcial Forgings Co.,
E. 91st St., Cleveland, O.
& Laughlin Steel Corp.,
& Laughlin Bldg.,
burgh, Pa.
Forge Co., 5301 W. Roose-
Blvd., Chicago, Ill.
al Forge & Ordnance Co.,
e, Warren Co., Pa.

NGS (Iron and Steel)
o Stainless)
Drop Forge Co.,
ing, Mich.
an Hollow Boring Co.,
W. 20th St., Erie, Pa.
ty Forge Co., W. 19th and
bery Sts., Erie, Pa.
em Steel Co.,
lehem, Pa.
ie-Illinois Steel Corp.,
burgh-Chicago.
da Steel Co.,
Francisco, Calif.
rcial Forgings Co.,
E. 91st St., Cleveland, O.
stall Co.,
& Hatfield Sts., Pittsburgh, Pa.
Forge Co., 5301 W. Roosevelt
., Chicago, Ill.
Machine Co.,
. Box 1466, Pittsburgh, Pa.
le Co., The,
town, Philadelphia, Pa.
nal Forge & Ordnance Co.,
e, Warren Co., Pa.
ll Supply Co., Dallas, Texas.
rd Steel Works Co.,
hall P. O., Philadelphia, Pa.
see Coal, Iron & Railroad Co.,
m Marx Bldg.,
ingham, Ala.

FORGINGS (Upset)
Atlas Drop Forge Co.,
Lansing, Mich.
Bethlehem Steel Co.,
Bethlehem, Pa.

FROGS AND SWITCHES
Atlas Car & Mfg. Co., The,
1140 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co.,
Bethlehem, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.

FURNACE INSULATION—See INSULATION

FURNACES (Blast)
Brassert, H. A., & Co.,
310 So. Michigan Ave., Chicago, Ill.

FURNACES (Brazing)
American Gas Furnace Co.,
Elizabeth, N. J.
Hevi Duty Electric Co., 4100 W.
Highland Blvd., Milwaukee, Wis.

FURNACES (Electric Heating)
Ajax Electrothermic Corp.,
Ajax Park, Trenton, N. J.
Electric Furnace Co., The,
Salem, O.
General Electric Co.,
Schenectady, N. Y.
Hagan, Geo. J., Co.,
2400 E. Carson St., Pittsburgh, Pa.
Hevi Duty Electric Co., 4100 W.
Highland Blvd., Milwaukee, Wis.
Pittsburgh Lectromelt Furnace Corp.,
P. O. Box 1125, Pittsburgh, Pa.
Salem Engineering Co.,
714 So. Broadway, Salem, O.

FURNACES (Electric Melting)
Ajax Electrothermic Corp.,
Ajax Park, Trenton, N. J.
American Bridge Co.,
Frick Bldg., Pittsburgh, Pa.
General Electric Co.,
Schenectady, N. Y.
Hagan, Geo. J., Co.,
2400 E. Carson St., Pittsburgh, Pa.
Pittsburgh Lectromelt Furnace Corp.,
P. O. Box 1125, Pittsburgh, Pa.

FURNACES (Forging)
Ajax Electrothermic Corp.,
Ajax Park, Trenton, N. J.
American Gas Furnace Co.,
Elizabeth, N. J.
Electric Furnace Co., The,
Salem, O.
Hagan, Geo. J., Co.,
2400 E. Carson St., Pittsburgh, Pa.
Pennsylvania Industrial Engineers,
2413 W. Magnolia St.,
Pittsburgh, Pa.
Salem Engineering Co.,
714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago
Flexible Shaft Co., 1106 So.
Central Ave., Chicago, Ill.
Surface Combustion Corp.,
2375 Dorr St., Toledo, O.

FURNACES (Galvanizing)
Salem Engineering Co.,
714 So. Broadway, Salem, O.
Spowers, W. H., Jr.,
551 Fifth Ave., New York City.
Stewart Furnace Div., Chicago
Flexible Shaft Co., 1106 So.
Central Ave., Chicago, Ill.

FURNACES (Gas or Oil)
American Gas Furnace Co.,
Elizabeth, N. J.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Pennsylvania Industrial Engineers,
2413 W. Magnolia St.,
Pittsburgh, Pa.
Salem Engineering Co.,
714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago
Flexible Shaft Co., 1106 So.
Central Ave., Chicago, Ill.
Surface Combustion Corp.,
2375 Dorr St., Toledo, O.

FURNACES (Heat Treating, Annealing, Carburizing, Hardening, Tempering)
Ajax Electrothermic Corp.,
Ajax Park, Trenton, N. J.
American Gas Furnace Co.,
Elizabeth, N. J.
Carborundum Co., The,
Perth Amboy, N. J.
Electric Furnace Co., The,
Salem, O.
General Electric Co.,
Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.

HERE'S YOUR HOTEL in Cleveland
There's a big, outside room—with private bath and circulating ice water—set aside for you. You'll like the delicious meals served in our four restaurants. You're right in the center of things, too. The leading stores, theatres, office buildings, and Union Depot, are all located within a five block radius of the Carter.
RATES
Single: $2.75 to $6.00
Double: $4.00 to $8.00
600 ROOMS
HOTEL CARTER
CLEVELAND
Affiliated with American Hotels Corporation • J. Leslie Kincaid, President

NO FUMES • NO ACID WASTE
NO BRITTLENESS • NO BLISTERS
Just use **RODINE** in Pickling
CHEMICALS ACP PROCESSES
AMERICAN CHEMICAL PAINT CO.
AMBLER PENNSYLVANIA
Detroit, 6339 Palmer Ave., E. • Canadian Branch, Walkerville, Ont.

SPECIALISTS
FOR OVER A HALF CENTURY
IN MANUFACTURE OF
REINFORCING OILS,
PROTECTIVE COATINGS AND PAINTS
SPECIFICALLY DESIGNED TO MEET
EXACTING SERVICE CONDITIONS
FOR MAINTENANCE AND PRODUCTION.
JAMES B. SIPE & COMPANY
Paint Engineers and Manufacturers
SOUTH HILLS BRANCH PITTSBURGH, PA.

MORALE is shown by salesmen with *genuine engraved* business cards in Wiggins Compact Binders; for they can then be sure their first impressions will be flawless, without need of apology.
We will gladly quote on genuine engraved business cards.

The John B. WIGGINS *Company*
1153 Fullerton Avenue, Chicago
Book Form Cards *Compact Binder*

FURNACES (Heat Treating, Annealing, Carburizing, Hardening, Tempering) Con.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., 1106 So. Central Ave., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

FURNACES (Industrial)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Hagan Corp., 300 Ross St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., 1106 So. Central Ave., Chicago, Ill.

FURNACES (Laboratory)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
American Gas Furnace Co., Elizabeth, N. J.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.

FURNACES (Non-Ferrous Melting)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
American Gas Furnace Co., Elizabeth, N. J.

FURNACES (Open Hearth)
Brassert, H. A., & Co., 310 S. Michigan Ave., Chicago, Ill.
Criswell, James, Co., Keenan Bldg., Pittsburgh, Pa.

FURNACES (Recuperative)
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

FURNACES (Rivet Heating)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
American Gas Furnace Co., Elizabeth, N. J.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Salem Engineering Co., Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

FURNACES (Sheet and Tin Mill)
Aetna-Standard Engineering Co., The, Youngstown, O.
Electric Furnace Co., The, Salem, O.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

FURNACES (Steel Mill)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Criswell, James, Co., Keenan Bldg., Pittsburgh, Pa.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

FURNITURE (Tubular Steel)
Wallace Supplies Mfg. Co., 1304 Diversey Parkway, Chicago, Ill.

GAGES
Greenfield Tap & Die Corp., Greenfield, Mass.

GALVANIZING (Consulting)
Spowers, W. H., Jr., 551 Fifth Ave., New York City.

GALVANIZING (Hot Dip)
Acme Galvanizing, Inc., Milwaukee, Wis.
Acme Steel & Malleable Iron Works, Buffalo, N. Y.
American Hot Dip Galvanizers Asso., Inc., 903 American Bank Bldg., Pittsburgh, Pa.
American Tinning & Galvanizing Co., Erie, Pa.
Buffalo Galvanizing & Tinning Works, Inc., Buffalo, N. Y.
Cattie, Jos. P., & Bros., Gaul and Liberty Sts., Philadelphia, Pa.
Chain Products Co., The, Cleveland, O.
Diamond Expansion Bolt Co., Inc., Garwood, N. J.
Enterprise Galvanizing Co., 2507 E. Cumberland St., Philadelphia, Pa.
Thomas Gregory Galvanizing Works, Maspeth, N. Y.
Hanlon-Gregory Galvanizing Co., Pittsburgh, Pa.
Joslyn Mfg. & Supply Co., Chicago, Ill.
Koven, L. O., & Bro., Inc., Jersey City, N. J.
Lehigh Structural Steel Co., Allentown, Pa.
Missouri Rolling Mill Corp., St. Louis, Mo.
National Telephone Supply Co., The, Cleveland, O.
Penn Galvanizing Co., Philadelphia, Pa.
Riverside Foundry & Galvanizing Co., Kalamazoo, Mich.
Standard Galvanizing Co., Chicago, Ill.
Wilcox, Crittenden & Co., Inc., Middletown, Conn.
Witt Cornice Co., The, Cincinnati, O.

GALVANIZING COMPOUNDS
American Solder & Flux Co., 4519 Wayne Ave., Philadelphia, Pa.

GALVANIZING PLANTS (Designing)
Spowers, W. H., Jr., 551 Fifth Ave., New York City.

GALVANIZING PLANTS FOR SHEETS
Aetna-Standard Engineering Co., The, Youngstown, O.
Erie Foundry Co., Erie, Pa.
Wean Engineering Co., Warren, O.

GAS (Detarring)
Research Corp., 405 Lexington Ave., New York City.
Western Precipitation Corp., 1016 W. 9th St., Los Angeles, Calif.

GAS HOLDERS
Bartlett-Hayward Div., The Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Petroleum Iron Works Co., Sharon, Pa.
Western Gas Div., The Koppers Co., Fort Wayne, Ind.

GAS PRODUCERS PLANTS
Koppers Co., Engineering and Construction Div., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

GAS RECOVERY COKE OVEN AND GAS PLANTS
Bartlett-Hayward Div., The Koppers Co., Baltimore, Md.
Koppers Co., Engineering and Construction Div., Pittsburgh, Pa.
Research Corp., 405 Lexington Ave., New York City.
Western Precipitation Corp., 1016 W. 9th St., Los Angeles, Calif.
Wilputte Coke Oven Corp., 570 Lexington Ave., New York City.

GAS SCRUBBERS
Bartlett-Hayward Div., The Koppers Co., Baltimore, Md.
Brassert, H. A., & Co., 310 So. Michigan Ave., Chicago, Ill.
Research Corp., 405 Lexington Ave., New York City.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
Western Precipitation Corp., 1016 W. 9th St., Los Angeles, Calif.

GASKETS (Asbestos, Metal or Rubber)
American Hard Rubber Co., 11 Mercer St., New York City.
Johns-Manville Corp., 22 E. 40th St., New York City.

GAUGES (Indicating and Recording)
General Electric Co., Schenectady, N. Y.

GEAR BLANKS
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Commercial Forgings Co., 3710 E. 91st St., Cleveland, O.
King Fifth Wheel Co., 5027 Beaumont Ave., Philadelphia, Pa.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.
Waldron, John, Corp., New Brunswick, N. J.

GEAR MACHINERY (Generating)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
344 Vulcan St., Buffalo, N. Y.

GEARS (Non-Metallic)
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.

GEARS (Spur, Bevel, Miter)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
344 Vulcan St., Buffalo, N. Y.
Horsburgh & Scott Co., The, 5114 Hamilton Ave., Cleveland, O.
Jones, W. A., Fdry. & Mach. Co., 4401 W. Roosevelt Rd., Chicago, Ill.
National-Erie Corp., Erie, Pa.
Simonds Gear & Mfg. Co., The, 2501 Liberty St., Pittsburgh, Pa.

GEARS (Steel Laminated)
Waldron, John, Corp., New Brunswick, N. J.

GEARS (Worm)
Cleveland Worm & Gear Co., 3249 E. 80th St., Cleveland, O.
Horsburgh & Scott Co., The, 5114 Hamilton Ave., Cleveland, O.
Simonds Gear & Mfg. Co., The, 2501 Liberty St., Pittsburgh, Pa.

GEARS AND GEAR CUTTING
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
344 Vulcan St., Buffalo, N. Y.
General Electric Co., Schenectady, N. Y.
Grant Gear Works, 2nd and B Sts., Boston, Mass.
Horsburgh & Scott Co., The, 5114 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1114 W. Monroe St., Chicago, Ill.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
National-Erie Corp., Erie, Pa.
Simonds Gear & Mfg. Co., 2501 Liberty Ave., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

GENERATING SETS
Fairbanks, Morse & Co., 600 So. Wabash Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Reliance Electric & Mfg. Co., 1088 Ivanhoe Rd., Cleveland, O.

GENERATORS (Acetylene—Portable and Stationary)
Linde Air Products Co., The, 30 E. 42nd St., New York City.

GENERATORS (Electric)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O., Dept. 20-4.
Reliance Electric & Mfg. Co., 1088 Ivanhoe Rd., Cleveland, O.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

GRABS — FOR SHEETS, INGOTS
J-B Engineering Sales Co., New Haven, Conn.

GRATING
Blaw-Knox Co., Blawnox,
Dravo Corp., Machinery Dravo Bldg., Pittsburgh,
Tri-Lok Co., Dravo Bldg. Pittsburgh, Pa.

GREASE (Lubricating—See LUBRICANTS (Industri

GREASE RETAINERS AN SEALS
Chicago Rawhide Mfg. Co 1308 Elston Ave., Chica

GRINDERS (Portable—Pn
Ingersoll-Rand Co., 11 Broadway, New York

GRINDERS (Precision Thr
Jones & Lamson Machine Springfield, Vt.

GRINDERS (Surface)
Heald Machine Co., Worcester, Mass.

GRINDING COMPOUNDS
Houghton, E. F., & Co., Somerset St., Philadelp
Sun Oil Co., 1608 Walnut Philadelphia, Pa.

GRINDING MACHINES (Automotive Reconditioni
Heald Machine Co., Worcester, Mass.
Landis Tool Company, Waynesboro, Pa.

GRINDING MACHINES (less, Internal and Exter
Cincinnati Milling Machine Oakley Sta., Cincinnati,
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES (Chucking)
Cincinnati Milling Machine Oakley Sta., Cincinnati,
Heald Machine Co., Worcester, Mass.
Landis Tool Company, Waynesboro, Pa.

GRINDING MACHINES (Pin, Cam, Piston, Valve
Cincinnati Milling Machine Oakley Sta., Cincinnati,
Landis Tool Company, Waynesboro, Pa.

GRINDING MACHINES (Oscillating)
Cincinnati Milling Machine Oakley Sta., Cincinnati, O
Landis Tool Company, Waynesboro, Pa.

GRINDING MACHINES (Plain and Universal)
Cincinnati Milling Machine Oakley Sta., Cincinnati,
Landis Tool Co., Waynesbo
Norton Co., Worcester, Mas

GRINDING MACHINES (R
Cincinnati Milling Machine Oakley Sta., Cincinnati, C
Farrel-Birmingham Co., Inc 110 Main St., Ansonia, C
344 Vulcan St., Buffalo, N
Landis Tool Co., Waynesbor
Mesta Machine Co., P. O. Bo Pittsburgh, Pa.
Norton Co., Worcester, Mass

GRINDING MACHINES (Rotary Surface)
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES (Swing Frame)
Excelsior Tool & Machine C Ridge and Jefferson Aves., East St. Louis, Ill.

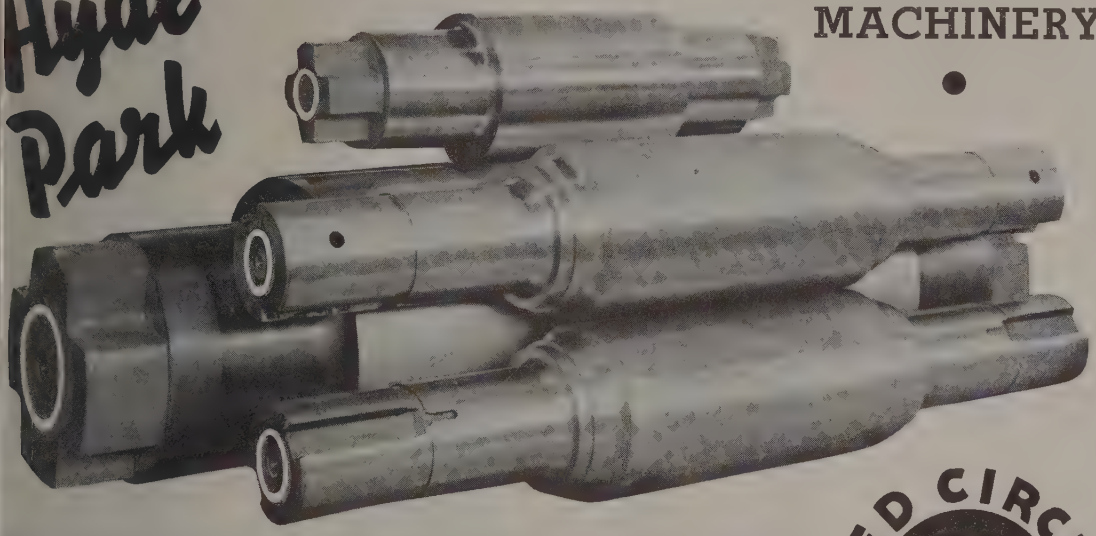
GRINDING MACHINES (Tool and Cutter)
Cincinnati Milling Machine Oakley Sta., Cincinnati, O.
Landis Tool Co., Waynesbor
Norton Co., Worcester, Mass.

GRINDING WHEELS
Abrasive Co., Taconey & Frale Philadelphia, Pa.
Carborundum Co., The, Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

GUIDE SHOES
Youngstown Alloy Casting C 103 E. Indianola Ave., Youngstown, O.

Hyde Park

CHILLED ROLLS and ROLLING MILL MACHINERY



"Red Circle" heat treated Alloy and Plain Chilled Rolls for three and four-high Mills, Sheet and Tin Mills. Moly Rolls, Nickel Chilled, Grain Rolls, Cold Rolls and and Rolls.

Sheet and Tin Mill Shears of all kinds, Roll Lathes, Steam Doublers, Sheet Pack Carriers, Stretcher Levellers and Rolling Mill Machinery built to specifications.

Let HYDE PARK Quote on your next requirements.

RED CIRCLE Rolls CHILLED

HYDE PARK FOUNDRY & MACHINE CO.

Hyde Park (*Pittsburgh District*) **Pennsylvania**

AW-BOX CRANE & HOIST DIVISION

ING, MAXWELL & MOORE, INC. MUSKEGON, MICHIGAN

MANUFACTURERS OF "SHAW-BOX" ELECTRIC AND HAND OPERATED CRANES, "LOAD LIFTER," AND "BUDGIT" ELECTRIC HOISTS — A STYLE AND SIZE FOR EVERY NEED. • • • • *BEFORE BUYING — WRITE "SHAW-BOX!"*

S — FIXTURES — SPECIAL MACHINES — PUNCHES—DIES—*"to your measure"!*

Our trained engineers apply our 33 years' experience to your ment problem. Our successes in other plants of all types, and d methods assure a solution of any question involving produc- machinery. Write us in detail without obligation.

COLUMBUS DIE, TOOL AND MACHINE CO.
COLUMBUS, OHIO

LOCOMOTIVE CRANES
CRAWLER CRANES
SHOVELS

OHIO

OHIO LOCOMOTIVE CRANE CO.
BUCYRUS OHIO

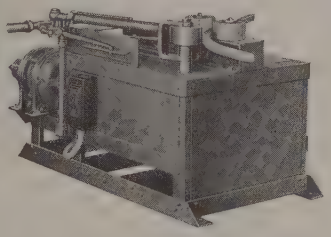
LEWIS

Wire Straightening and Cutting Machines
FOR
$\frac{1}{32}$" to $\frac{3}{4}$" Round, Square or Hex.
Automatic — High Speed — Heavy-Duty

LEWIS MACHINE CO., 3438 E. 76 Street, Cleveland, O.

KARDONG CIRCLE BENDER

This is a powerful and fast machine for heavy duty work in both fabricating plants or in the field where large tonnage is required. It will handle as high as 20 tons a day. Circles of any size required in concrete reinforcing work from 18 inches in diameter up can be bent on this machine. It will bend bars with two or more radius on the same bar without stopping the machine.



Made in two sizes

Model "C" Capacity 1¼ inch
Model "CA" Capacity 1 inch

Write for catalog of our complete line of reinforcing bar benders.

KARDONG BROTHERS, INC.
MINNEAPOLIS, MINN.

WIRE STRAIGHTENING and CUTTING MACHINERY

HIGH SPEED Machines for round wire, flat wire, welding wire, all kinds of wire.

The F. B. Shuster Company
New Haven, Conn.

Straightener Specialists Since 1866

GUIDES (Mill)
National-Erie Corp., Erie, Pa.

GUNS (Blast Furnace Mud)
Bailey, Wm. M., Co.,
702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc.,
Sharpsburg, Pa.

GUNS (Steam, Hydraulic, Electric)
Bailey, Wm. M., Co.,
702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc.,
Sharpsburg, Pa.

HACK SAWS
Simonds Saw & Steel Co.,
Fitchburg, Mass.

HAMMER BOARDS
Irwin, H. G. Lumber Co.,
822 E. 8th St., Erie, Pa.

HAMMERS (Chipping, Riveting, Calking)
Ingersoll-Rand Co.,
11 Broadway, New York City.

HAMMERS (Drop)
Alliance Machine Co., The,
Alliance, O.
Chambersburg Engineering Co.,
Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc.,
110 Main St., Ansonia, Conn.
344 Vulcan St., Buffalo, N. Y.
Industrial Brownhoist Corp.,
Bay City, Mich.
Morgan Engineering Co., The,
Alliance, O.

HAMMERS (Steam)
Alliance Machine Co., The,
Alliance, O.
Chambersburg Engineering Co.,
Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp.,
Bay City, Mich.
Morgan Engineering Co., The,
Alliance, O.

HANGERS
Ahlberg Bearing Co., 3025 W. 47th St., Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

HANGERS (Shaft)
Bantam Bearings Corp.,
South Bend, Ind.
Fafnir Bearing Co.,
New Britain, Conn.
Hyatt Bearings Division,
General Motors Corp.,
Harrison, N. J.
New Departure Div., General Motors Corp., Bristol, Conn.
Shafer Bearing Corp.,
35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

HARDENING—See Case HARDENING

HARDWARE SPECIALTIES
Budd, Edw. G., Mfg. Co.,
25th St. & Huntington Park Ave., Philadelphia, Pa.
Peoria Malleable Castings Co.,
Peoria, Ill.

HEAT TREATING MATERIALS
Houghton, E. F., & Co., 240 W. Somerset St., Philadelphia, Pa.

HEATERS (Air)
Babcock & Wilcox Co.,
19 Rector St., New York City.

HEATERS (Unit)
Dravo Corp., Machinery Div.,
Dravo Bldg., Pittsburgh, Pa.

HITCHINGS (Mine Car)
American Chain & Cable Co.,
Bridgeport. Conn.

HOBBING MACHINES
Barber Colman Co.,
150 Loomis St., Rockford, Ill.

HOBS
Barber Colman Co.,
150 Loomis St., Rockford, Ill.

HOISTS (Chain)
American Chain & Cable Co.,
Bridgeport, Conn.
Ford Chain Block Co., York, Pa
Yale & Towne Mfg. Co.,
4530 Tacony St., Philadelphia, Pa.

HOISTS (Electric)
American Chain & Cable Co.,
Bridgeport, Conn.
American Engineering Co.,
2484 Aramingo Ave.,
Philadelphia, Pa.
American MonoRail Co., The,
13107 Athens Ave., Cleveland, O.
Atlas Car & Mfg. Co., The,
1140 Ivanhoe Rd., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.,
Wickliffe, O.
Ford Chain Block Co., York, Pa.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp.,
Bay City, Mich.
Shaw-Box Crane & Hoist Div.,
Manning, Maxwell & Moore, Inc.,
406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp.,
Montour Falls, N. Y.
Yale & Towne Mfg. Co.,
4530 Tacony St., Philadelphia, Pa.

HOISTS (Monorail)
American Chain & Cable Co.,
Bridgeport, Conn.
American Engineering Co.,
2484 Aramingo Ave.,
Philadelphia, Pa.
American MonoRail Co., The,
13107 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.,
Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Shaw-Box Crane & Hoist Div.,
Manning, Maxwell & Moore, Inc.,
406 Broadway, Muskegon, Mich.
Shepard-Niles Crane & Hoist Corp.,
Montour Falls, N. Y.
Yale & Towne Mfg. Co.,
4530 Tacony St., Philadelphia, Pa.

HOISTS (Pneumatic)
Curtis Pneumatic Machinery Co.,
1996 Kienlen Ave., St. Louis, Mo.
Ingersoll-Rand Co.,
11 Broadway, New York City.

HOOKS (Chain)
American Chain & Cable Co.,
Bridgeport, Conn.

HOOPS AND BANDS
Allegheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.
American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Columbia Steel Co.,
San Francisco, Calif.
Ryerson, Jos. T., & Son, Inc.,
16th & Rockwell St., Chicago, Ill.
Stanley Works, The,
New Britain, Conn.
Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg.,
Birmingham, Ala.
Youngstown Sheet & Tube Co.,
Youngstown, O.

HOSE (Flexible Metallic)
American Brass Co., The,
American Metal Hose Branch,
Waterbury, Conn.

HOSE (Rubber)
Goodyear Tire & Rubber Co.,
Akron, O.
United States Rubber Co.,
1790 Broadway, New York City.

HYDRAULIC MACHINERY
Alliance Machine Co., The,
Alliance, O.
Allis-Chalmers Mfg. Co.,
Milwaukee, Wis.
Bethlehem Steel Co.,
Bethlehem, Pa.
Chambersburg Engineering Co.,
Chambersburg, Pa.
Farrel-Birmingham Co., Inc.,
110 Main St., Ansonia, Conn.
344 Vulcan St., Buffalo, N. Y.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Morgan Engineering Co., The,
Alliance, O.
Wood, R. D., Co., 400 Chestnut St.,
Philadelphia, Pa.

HYDRAULIC PRESSES—See PRESSES (Hydraulic)

INDICATORS (Temperature)
American Gas Furnace Co.,
Elizabeth, N. J.
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave.,
Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.

INDICATORS (Blast Furnace Stock Line)
Brosius, Edgar E., Inc.,
Sharpsburg, Pa.

INGOT MOLDS
Bethlehem Steel Co.,
Bethlehem, Pa.
Shenango-Penn Mold Co.,
Oliver Bldg., Pittsburgh, Pa.
Valley Mould & Iron Co.,
Hubbard, O.

INGOT PIPE ELIMINATORS
Alpha-Lux Co., 192 Front St.,
New York City.

INHIBITORS
American Chemical Paint Co.,
Ambler, Pa.
Parkin, Wm. M., Co., The,
1005 Highland Bldg.,
Pittsburgh, Pa.

INSTRUMENTS (Electric Indicating and Recording)
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave.,
Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
General Electric Co.,
Schenectady, N. Y.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.

INSULATING BLOCK
Armstrong Cork Products Co.,
Lancaster, Pa.
Johns-Manville Corp.,
22 E. 40th St., New York City.
Quigley Company, Inc.,
56 W. 45th St., New York City.

INSULATING BRICK
Armstrong Cork Products Co.,
Lancaster, Pa.
Johns-Manville Corp.,
22 E. 40th St., New York City.
Quigley Company, Inc.,
56 W. 45th St., New York City.

INSULATING POWDER AND CEMENT
Ajax Electrothermic Corp.,
Ajax Park, Trenton, N. J.
Armstrong Cork Products Co.,
Lancaster, Pa.
Babcock & Wilcox Co.,
19 Rector St., New York City.
Quigley Company, Inc.,
56 W. 45th St., New York City.

INSULATION (Furnace, Boiler Settings, Ovens, Steam Pipe, Etc.)
Armstrong Cork Products Co.,
Lancaster, Pa.
Johns-Manville Corp.,
22 E. 40th St., New York City.
Quigley Company, Inc.,
56 W. 45th St., New York City.

IRON (Bar)
Ryerson, Jos. T., & Son Co.,
16th & Rockwell Sts., Chicago, Ill.

IRON (Ornamental)
Superior Iron & Wire Works, The,
39 Pride St., Pittsburgh, Pa.

IRON ORE
Alan Wood Steel Co.,
Conshohocken, Pa.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Hanna Furnace Corp., The,
Ecorse, Detroit, Mich.
Shenango Furnace Co.,
Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co.,
Oliver Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

JIGS AND FIXTURES
Columbus Die, Tool & Mach. Co.,
955 Cleveland Ave., Columbus, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.

KETTLES (Galvanizing)
Petroleum Iron Works Co.,
Sharon, Pa

KEYS (Machine)
Moltrup Steel Products Co.,
Beaver Falls, Pa.

KEYS (Woodruff)
Moltrup Steel Products Co.,
Beaver Falls, Pa.

KNIVES (Rotary)
American Shear Knife Co.,
3rd and Ann Sts., Homestead, Pa.
Cowles Tool Co.,
2086 W. 110th St., Cleveland, O.

KNIVES (Shear, Solid Steel, Flying)
American Shear Knife Co.,
3rd and Ann Sts., Homestead, Pa.

LABORATORY WARE
Norton Company, Worcester, Mass.

LACQUERS
Sipe, James B., & Co., Inc.,
So. Hills Branch, Pittsburgh, Pa.

LADLES
Petroleum Iron Works Co
Sharon, Pa.

LAMPS (Filaments)
General Electric Co.,
Nela Park, Cleveland,

LAMPS (Mercury Vapor)
General Electric Vapor L
885 Adams St., Hoboken

LAMPS (Neon Glow)
General Electric Vapor La
885 Adams St., Hoboken

LAPPING MACHINES
Cincinnati Milling Machine
Oakley Sta., Cincinnati,

LARRIES (Coal)
Atlas Car & Mfg. Co., Th
1140 Ivanhoe Rd., Cleve

LATHES
LeBlond, R. K., Machine T
2694 Madison Rd., Cinci

LATHES (Automatic)
Jones & Lamson Machine
Springfield, Vt.

LATHES (Roll Turning)
Continental Roll & Steel F
E. Chicago, Ind.
Hyde Park Foundry & Mac
Hyde Park, Pa.
Lewis Fdry. & Mach. Co.,
P. O. Box 1586, Pittsburg
Mackintosh-Hemphill Co.,
Bingham Sts., Pittsburgh
Mesta Machine Co.,
P. O. Box 1466, Pittsbur
United Engineering & Fdry
First National Bank Bld
Pittsburgh, Pa.

LATHES (Turret)
Bullard Company, The,
Bridgeport, Conn.
Jones & Lamson Machine
Springfield, Vt.

LATHES (Turret) (Automatic Vertical)
Bullard Company, The,
Bridgeport, Conn.

LEAD (Chemical, Corrodin Desilvered)
St. Joseph Lead Co.,
250 Park Ave., New Yor

LEAD (Tellurium)
National Lead Co.,
111 Broadway, New York

LETTERHEADS (Engraved
Modern Card Co.,
1153 Fullerton Ave., Chic

LEVELING MACHINES
Aetna-Standard Engineering
The, Youngstown, O.
Erie Foundry Co., Erie, Pa
Hyde Park Foundry & Mac
Hyde Park, Pa.
McKay Machine Co.,
Youngstown, O.
Mesta Machine Co., P. O. B
Pittsburgh, Pa.
Sutton Engineering Co., Par
Pittsburgh, Pa.
Wean Engineering Co., Wa

LIGHT OIL RECOVERY TREATMENT EQUIPME
Wilputte Coke Oven Corp.
570 Lexington Ave.,
New York City.

LIFT TRUCKS—See TRUCK (Lift)

LIFTING MAGNETS—See MAGNETS (Lifting)

LIGHTING (Industrial)
General Electric Vapor Lam
885 Adams St., Hoboken.

LINERS (Pump and Cylinde
Shenango-Penn Mold Co., D

LOCOMOTIVE CRANES—Se CRANES (Locomotive)

LOCOMOTIVES (Diesel-Elec
Plymouth Locomotive Work
Plymouth, O.
Whitcomb Locomotive Div.,
Baldwin Locomotive Wo
Paschall P. O., Philadelp

LOCOMOTIVES (Diesel Me cal)
Plymouth Locomotive Work
Plymouth, O.
Whitcomb Locomotive Div
Baldwin Locomotive Wo
Paschall P. O., Philadelphi

OTIVES (Electric Trolley)
ar & Mfg. Co., The,
vanhoe Rd., Cleveland, O.
Electric Co.,
ctady, N. Y.
b Locomotive Division, The
in Locomotive Works, Pas-
P. O. Sta., Philadelphia, Pa.

OTIVES (Gasoline-Electric)
ar & Mfg. Co., The,
vanhoe Rd., Cleveland, O.
Electric Co.,
ctady, N. Y.
b Locomotive Division, The
in Locomotive Works, Pas-
P. O., Philadelphia, Pa.

OTIVES (Gasoline Mechanical)
b Locomotive Div., The
in Locomotive Works,
ll P. O., Philadelphia, Pa.

OTIVES (Oil-Electric)
ar & Mfg. Co., The,
vanhoe Rd., Cleveland, O.
l-Rand Co.,
oadway, New York City.
b Locomotive Division, The
in Locomotive Works, Pas-
P. O. Sta., Philadelphia, Pa.

OTIVES (Storage Battery)
ar & Mfg. Co., The,
vanhoe Rd., Cleveland, O.
Electric Co.,
ctady, N. Y.
b Locomotive Division, The
in Locomotive Works, Pas-
P. O. Sta., Philadelphia, Pa.

ANTS (Industrial)
Corp. of Penna.,
Refining Co., 3800 Gulf Bldg.,
burgh, Pa.
n, E. F., & Co., 240 W.
set St., Philadelphia, Pa.
ork & New Jersey Lubricant
292 Madison Ave.,
York City.
il Co., The,
Wacker Dr., Chicago, Ill.
nion Oil Corp.,
50th St., New York City.
Vacuum Oil Co., Inc.,
oadway, New York City.
Co.,
Walnut St., Philadelphia, Pa.
ater Associated Oil Co.,
ttery Place, New York City.

CATING SYSTEMS
Corp.,
E. 80th St., Cleveland, O.

NE WORK
Sdw. G., Mfg. Co.,
St. & Huntington Park Ave.,
lelphia, Pa.
ntal Roll & Steel Fdry. Co.,
hicago, Ind.
Birmingham Co., Inc.,
Main St., Ansonia, Conn.
Vulcan St., Buffalo, N. Y.
Shipbuilding & Dry Dock
Kearney, N. J.
ark Foundry & Machine Co.,
Park, Pa.
Foundry & Machine Co.,
Box 1586, Pittsburgh, Pa.
Engineering Co., The,
nce, O.

NERY (Second Hand)
albreath Machinery Co.,
ater St., Pittsburgh, Pa.

NERY (Special)
Machine Co., The,
nce, O.
almers Mfg. Co., The,
aukee, Wis.
ar & Mfg. Co., The,
Ivanhoe Rd., Cleveland, O.
ro Steel Fdry. & Mach. Co.,
boro, Pa.
Edgar E., Inc.,
sburg, Pa.
nd Punch & Shear Works,
St. Clair Ave., Cleveland, O.
us Die, Tool & Mach. Co.,
Cleveland Ave., Columbus, O.
ntal Roll & Steel Fdry. Co.,
hicago, Ind.
Birmingham Co., Inc.,
Main St., Ansonia, Conn.
Vulcan St., Buffalo, N. Y.
Foundry & Machine Co.,
Box 1586, Pittsburgh, Pa.
Engineering Co., The,
nce, O.
il-Erie Corp., Erie, Pa.
al Roll & Fdry. Co., The,
more, Pa.
a Machine & Tool Works,
Northland Ave.,
do, N. Y.
l Supply Co., Dallas, Texas.

Shuster, F. B., Co., The,
New Haven, Conn.
Sleeper & Hartley, Inc.,
Worcester, Mass.
Thomas Machine Mfg. Co.,
Pittsburgh, Pa.
United Engineering & Fdry. Co.
First National Bank Bldg.,
Pittsburgh, Pa.

MAGNESIA (Electrically Fused)
Norton Co., Worcester, Mass.

MAGNETIC SEPARATORS—See SEPARATORS (Magnetic)

MAGNETS (Lifting)
Dings Magnetic Separator Co.,
675 Smith St., Milwaukee, Wis.
Electric Controller & Mfg. Co.,
2698 E. 79th St., Cleveland, O.
Ohio Electric Mfg. Co., The,
5906 Maurice Ave., Cleveland, O.
Stearns Magnetic Mfg. Co.,
650 So. 28th St., Milwaukee, Wis.

MAGNETS (Separating)
Dings Magnetic Separator Co.,
675 Smith St., Milwaukee, Wis.
Ohio Electric Mfg. Co., The,
5906 Maurice Ave., Cleveland, O.
Stearns Magnetic Mfg. Co.,
650 So. 28th St., Milwaukee, Wis.

MANGANESE METAL AND ALLOYS
Electro Metallurgical Sales Corp.,
30 E. 42nd St., New York City.

MANGANESE ORE
Samuel, Frank, Co., Inc.,
Harrison Bldg., Philadelphia, Pa.

MANIPULATORS
Alliance Machine Co., The,
Alliance, O.
Continental Roll & Steel Fdry. Co.,
E. Chicago, Ind
Morgan Engineering Co., The,
Alliance, O.

MARKERS (Industrial)
Helmer-Staley, Inc.,
325 W. Huron St., Chicago, Ill.

MARKING DEVICES
Helmer-Staley, Inc.,
325 W. Huron St., Chicago, Ill.

METAL (Perforated)—See PERFORATED METAL

METAL BLAST ABRASIVES (Shot and Grit)
Pittsburgh Crushed Steel Co.,
61st St. and A. V. R. R.,
Pittsburgh, Pa.

METAL CLEANERS
American Chemical Paint Co.,
Ambler, Pa.
Houghton, E. F., & Co., 240 W.
Somerset St., Philadelphia, Pa.
Pennsylvania Salt Mfg. Co., 1000
Widener Bldg., Philadelphia, Pa.

METAL SPECIALTIES AND PARTS—See STAMPINGS

METAL STAMPINGS—See STAMPINGS

METALS (Nonferrous)
International Nickel Co., Inc., The,
67 Wall St., New York City.

MICROMETERS
Brown & Sharpe Mfg. Co.,
Providence, R. I.

MILLING MACHINES
Brown & Sharpe Mfg. Co.,
Providence, R. I.
Cincinnati Milling Machine Co.,
Oakley Sta., Cincinnati, O.

MILLING MACHINES (Milling and Centering Combined)
Jones & Lamson Machine Co.,
Springfield, Vt.

MILLS (Blooming, Universal, Plate, Sheet, Tin, Bar, Strip, Etc.)—See ROLLING MILL EQUIPMENT

MOLDS (Ingot)—See INGOT MOLDS

MOLYBDENUM
Climax Molybdenum Co.,
500 Fifth Ave., New York City.

MONEL METAL (All Commercial Forms)
International Nickel Co., Inc., The,
67 Wall St., New York City.

MONORAIL SYSTEMS
American MonoRail Co., The,
13107 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.,
Wickliffe, O.
Shepard Niles Crane & Hoist Corp.,
Montour Falls, N. Y.

MOTORS (Electric)
Allis-Chalmers Mfg. Co.,
Milwaukee, Wis.
Fairbanks, Morse & Co.,
600 So. Wabash Ave., Chicago, Ill.
General Electric Co.,
Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The,
Cleveland, O., Dept. 20-4.
Reliance Electric & Mfg. Co.,
1088 Ivanhoe Rd., Cleveland, O.
Wagner Electric Corp.,
4904 Baum Blvd., Pittsburgh, Pa.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

MUCK BAR
Samuel, Frank, & Co., Inc.,
Harrison Bldg., Philadelphia, Pa.

NAILS
(*Also Stainless)
American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co.,
Bethlehem, Pa.
Columbia Steel Co.,
San Francisco, Calif.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
*Pittsburgh Steel Co.,
Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST,
Cleveland, O.
Tennessee Coal, Iron & Railroad Co.,
Brown-Marx Bldg.,
Birmingham, Ala.
Wickwire Brothers,
189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co.,
41 E. 42nd St., New York City.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

NAILS (Coated and Galvanized)
Wickwire Brothers, 189 Main St.,
Cortland, N. Y.

NICKEL (All Commercial Forms)
International Nickel Co., Inc., The,
67 Wall St., New York City.

NICKEL (Shot)
International Nickel Co., Inc., The,
67 Wall St., New York City.

NICKEL-CHROMIUM (Shot)
Driver-Harris Co., Harrison, N. J.

NICKEL STEEL (Cold Drawn)
Bethlehem Steel Co.,
Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Republic Steel Co., Dept. ST,
Cleveland, O.
Union Drawn Steel Co.,
Massillon, O.

NUTS
(*Also Stainless)
Bethlehem Steel Co.,
Bethlehem, Pa.
Cleveland Cap & Screw Co.,
2935 E. 79th St., Cleveland, O.
Ohio Nut & Bolt Co., The,
600 Front St., Berea, O.
*Republic Steel Corp.,
Upson Nut Div., Dept. ST,
1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Tinnerman Stove & Range Co.,
2039 Fulton Rd., Cleveland, O.

NUTS (Castellated)
Bethlehem Steel Co.,
Bethlehem, Pa.
Cleveland Cap Screw Co.,
2935 E. 79th St., Cleveland, O.
Republic Steel Corp.,
Upson Nut Div., Dept. ST,
1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS (Cold Punched)
Bethlehem Steel Co.,
Bethlehem, Pa.
Cleveland Cap Screw Co.,
2935 E. 79th St., Cleveland, O.
Ohio Nut & Bolt Co., The,
600 Front St., Berea, O.
Republic Steel Corp.,
Upson Nut Div., Dept. ST,
1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS (Hot Pressed)
Bethlehem Steel Co.,
Bethlehem, Pa.
Cleveland Cap Screw Co.,
2935 E. 79th St., Cleveland, O.
Republic Steel Corp.,
Upson Nut Div., Dept. ST,
1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS (Semi-Finished)
Bethlehem Steel Co.,
Bethlehem, Pa.
Cleveland Cap Screw Co.,
2935 E. 79th St., Cleveland, O.
Republic Steel Corp.,
Upson Nut Div., Dept. ST,
1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS (Wing)
Parker-Kalon Corp.,
200 Varick St., New York City.

OIL RETAINERS AND SEALS
Chicago Rawhide Mfg. Co.,
1308 Elston Ave., Chicago, Ill.

OILS (Cutting)
Gulf Oil Corp. of Penna.,
Gulf Refining Co.,
3800 Gulf Bldg., Pittsburgh, Pa.
Houghton, E. F., & Co., 240 W.
Somerset St., Philadelphia, Pa.
Pure Oil Co., The,
35 E. Wacker Dr., Chicago, Ill.
Shell Union Oil Corp.,
50 W. 50th St., New York City.
Sipe, James B., & Co. Inc.,
So. Hills Branch, Pittsburgh, Pa.
Socony-Vacuum Oil Co., Inc.,
26 Broadway, New York City.
Sun Oil Co., 1608 Walnut St.,
Philadelphia, Pa.
Tide Water Associated Oil Co.,
17 Battery Place, New York City.

OILS (Drawing)
Houghton, E. F., & Co., 240 W.
Somerset St., Philadelphia, Pa.

OILS (Lubricating)—See LUBRICANTS (Industrial)

OILS (Paint)
Sipe, James B., & Co. Inc.,
So. Hills Branch, Pittsburgh, Pa.

OILS (Rust Preventive)
American Chemical Paint Co.,
Ambler, Pa.
Sipe, James B., & Co. Inc.,
So. Hills Branch, Pittsburgh, Pa.

OPEN-HEARTH FURNACES—See FURNACES (Open-Hearth)

OVENS (Annealing, Japanning, Tempering)
Hagan, Geo. J., Co.,
2400 E. Carson St., Pittsburgh, Pa.
Stewart Furnace Div.,
Chicago Flexible Shaft Co.,
1106 So. Central Ave., Chicago, Ill.

OVENS (Coke, By-Product Recovery)
Koppers Co., Engineering and Construction Div., Pittsburgh, Pa.

OVENS (Core and Mold)
Pennsylvania Industrial Engineers,
2413 W. Magnolia St.,
Pittsburgh, Pa.

OXY-ACETYLENE WELDING AND CUTTING—See WELDING

OXYGEN IN CYLINDERS
Air Reduction Sales Co.,
60 E. 42nd St., New York City.
Linde Air Products Co., The,
30 E. 42nd St., New York City.
National Cylinder Gas Co.,
205 W. Wacker Dr., Chicago, Ill.

PACKING (Asbestos or Rubber)
Goodyear Tire & Rubber Co.,
Akron, O.
Johns-Manville Corp.,
22 E. 40th St., New York City.
United States Rubber Co.,
1790 Broadway, New York City.

PACKINGS—MECHANICAL LEATHER (Cup, U-Cup, Flange and Vees)
Chicago Rawhide Mfg. Co.,
1308 Elston Ave., Chicago, Ill.
Houghton, E. F., & Co., 240 W.
Somerset St., Philadelphia, Pa.

PAINT (Alkali Resisting)
Pennsylvania Salt Mfg. Co., 1000
Widener Bldg., Philadelphia, Pa.
Quigley Company, Inc.,
56 W. 45th St., New York City.
Sipe, James B., & Co. Inc.,
So. Hills Branch, Pittsburgh, Pa.

PAINT (Aluminum)
Koppers Co., Tar & Chemical Div.,
Pittsburgh, Pa.
Quigley Company, Inc.,
56 W. 45th St., New York City.
Sipe, James B., & Co. Inc.,
So. Hills Branch, Pittsburgh, Pa.

PAINT (Heat Resisting)
American Chemical Paint Co., Ambler, Pa.
Quigley Company, Inc., 56 W. 45th St., New York City.
Sipe, James B., & Co. Inc., So. Hills Branch, Pittsburgh, Pa.

PAINT (Industrial)
Quigley Company, Inc., 56 W. 45th St., New York City.
Sipe, James B., & Co. Inc., So. Hills Branch, Pittsburgh, Pa.

PAINT (Marking)
Helmer-Staley, Inc., 325 W. Huron St., Chicago, Ill.
Koppers Co., Tar & Chemical Div., Pittsburgh, Pa.
Sipe, James B., & Co. Inc., So. Hills Branch, Pittsburgh, Pa.

PAINT (Pretreatment)
American Chemical Paint Co., Ambler, Pa.
Sipe, James B., & Co. Inc., So. Hills Branch, Pittsburgh, Pa.

PAINT (Rust Preventive)
American Chemical Paint Co., Ambler, Pa.
Koppers Co., Tar & Chemical Div., Pittsburgh, Pa.
Quigley Company, Inc., 56 W. 45th St., New York City.
Sipe, James B., & Co. Inc., So. Hills Branch, Pittsburgh, Pa.

PAINT (Stick Form)
Helmer-Staley, Inc., 325 W. Huron St., Chicago, Ill.

PERFORATED METAL
Chicago Perforating Co., 2443 W. 24th Pl., Chicago, Ill.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.
Wickwire Spencer Steel Co., 41 E. 42nd St., New York City.

PHENOL RECOVERY PLANTS
Koppers Co., Engineering and Construction Div., Pittsburgh, Pa.
Wilputte Coke Oven Corp., 570 Lexington Ave., New York City.

PICKLING COMPOUND
American Chemical Paint Co., Ambler, Pa.
Houghton, E. F., & Co., 240 W. Somerset St., Philadelphia, Pa.
Parkin, Wm. M., Co., The, 1005 Highland Bldg., Pittsburgh, Pa.
Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia, Pa.

PICKLING EQUIPMENT
International Nickel Co., Inc., The, 67 Wall St., New York City.

PICKLING MACHINERY
Aetna-Standard Engineering Co., The, Youngstown, O.
Erie Foundry Co., Erie, Pa.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

PICKLING TANK LININGS
American Hard Rubber Co., 11 Mercer St., New York City.
Keagler Brick Co., 1443 W. Market St., Steubenville, O.
Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia, Pa

PICKLING TANKS—See TANKS (Pickling)

PIERCER POINTS
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

PIG IRON
Alan Wood Steel Co., Conshohocken, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Brooke, E. & G., Iron Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Jackson Iron & Steel Co., Jackson, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Samuel, Frank & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

PILING (Iron and Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 South Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Co., Dept. ST, Cleveland, O.

PILING (Pressure-Treated Wood)
Wood Preserving Corp., The, Koppers Bldg., Pittsburgh, Pa.

PILLOW BLOCKS (Ball)
Ahlberg Bearing Co., 3025 W. 47th St., Chicago, Ill.

PILLOW BLOCKS (Roller Bearing)
Ahlberg Bearing Co., 3025 W. 47th St., Chicago, Ill.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.

PILLOW BOXES
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

PINIONS (Mill)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 344 Vulcan St., Buffalo, N. Y.
Horsburgh & Scott Co., The, 5114 Hamilton Ave., Cleveland, O.
National-Erie Corp., Erie, Pa.
Simonds Gear & Mfg. Co., The, 2501 Liberty St., Pittsburgh, Pa.
United Engineering & Foundry Co., First National Bank Bldg., Pittsburgh, Pa.

PINS (Taper)
Moltrup Steel Products Co., Beaver Falls, Pa.

PIPE (Brass, Bronze, Copper—Rubber or Rubber Lined)
American Hard Rubber Co., 11 Mercer St., New York City.

PIPE (Brass, Bronze, Copper)
American Brass Co., The, 25 Broadway, New York City.
Bridgeport Brass Co., Bridgeport, Conn.
Shenango-Penn Mold Co., Dover, O.

PIPE (New and Used)
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.

PIPE (Square and Rectangular)
Youngstown Sheet & Tube Co., Youngstown, O.

PIPE (Steel)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, Middletown, O.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Crane Co., The, 836 So. Michigan Blvd., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Western Gas Div., The Koppers Co., Fort Wayne, Ind.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PIPE BALLS
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

PIPE BENDING
Crane Co., The, 836 So. Michigan Blvd., Chicago, Ill.

PIPE CUTTING AND THREADING MACHINERY
Aetna-Standard Engineering Co., The, Youngstown, O.
Landis Machine Co., Inc., Waynesboro, Pa.

PIPE ELIMINATORS
Alpha-Lux Co., Inc., 192 Front St., New York City.

PIPE FITTINGS
American Hard Rubber Co., 11 Mercer St., New York City.
Babcock & Wilcox Co., 19 Rector St., New York City.
Crane Co., The, 836 So. Michigan Blvd., Chicago, Ill.
Oil Well Supply Co., Dallas, Texas.
Worthington Pump & Machy. Corp., Harrison, N. J.

PIPE LINES (Riveted and Welded)
Bethlehem Steel Co., Bethlehem, Pa.
Petroleum Iron Works Co., Sharon, Pa.

PIPE MILL MACHINERY
Aetna-Standard Engineering Co., The, Youngstown, O.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PIPE STRAIGHTENING MACHINERY
Aetna-Standard Engineering Co., The, Youngstown, O.
Logeman Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Sutton Engineering Co., McKees Rocks, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PIPE TOOLS
Greenfield Tap & Die Corp., Greenfield, Mass.

PIPING CONTRACTORS
Power Piping Co., Beaver and Western Ave., Pittsburgh, Pa.

PISTON RINGS
American Hammered Piston Ring Div., The Koppers Co., Baltimore, Md.

PISTON RODS
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Heppenstall Co., 47th and Hatfield Sts., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Kropp Forge Co., 5301 W. Roosevelt Blvd., Chicago, Ill.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.
Union Drawn Steel Co., Massillon, O.

PLANERS AND SHAPERS
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Punch & Shear Works, 3917 St. Clair Ave., Cleveland, O.

PLATE CASTORS
Hyatt Bearings Div., General Motors Corp., Harrison, N. J.

PLATES (Sheared or Universal) (*Also Stainless)
*Alan Wood Steel Co., Conshohocken, Pa.
*Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co., Middletown, O.
*Bethlehem Steel Co., Bethlehem, Pa.
*Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
*Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Worth Steel Co., Claymont, Del.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PLATES (Stainless Clad
Granite City Steel Co., Granite City, Ill.

PLATES (Steel—Floor)—FLOORING (Steel)

PLATES (Terne and Tin) TIN PLATE

PLUGS (Expansion)
Hubbard, M. D., Spring 613 Central Ave., Pont

PLUGS (Rolling Mill)
Youngstown Alloy Casting 103 E. Indianola Ave. Youngstown, O.

PLUGS (Rubber)
Rhoades, R. W., Metaline 50 Third St., Long Isl. N. Y.

POLES (Tubular Steel)
National Tube Co., Frick Bldg., Pittsburgh,

POLISHING MACHINER (Tube and Bar)
Medart Co., The, 3500 de St., St. Louis, Mo.

POLISHING MACHINES, MATIC (Stainless Ste
Excelsior Tool & Machine Ridge and Jefferson Av East St. Louis, Ill.

POTS (Case Hardening)
Pressed Steel Tank Co., Milwaukee, Wis.

POTS (Melting)
Farrel-Birmingham Co., 110 Main St., Ansonia, 344 Vulcan St., Buffalo,
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltin

PRECIPITATORS (Cottrel Electric)
Research Corp., 405 Lexi Ave., New York City.
Western Precipitation Corp 1016 W. 9th St., Los A Calif.

PREHEATERS
Babcock & Wilcox Co., 19 Rector St., New York

PRESSED METAL PART
Stanley Works, The, Press Div., New Britain, Conn.

PRESSES
Cleveland Punch & Shear W 3917 St. Clair Ave., Cleve
Erie Foundry Co., Erie, P
Farrel-Birmingham Co., In 110 Main St., Ansonia, C 344 Vulcan St., Buffalo,
Logeman Brothers Co., 312 leigh St., Milwaukee, Wis
Niagara Machine & Tool W 637 Northland Ave., Buffalo, N. Y.
Tomkins-Johnson Co., 611 N. Mechanics St., Jackson, Mich.

PRESSES (Forging)
Erie Foundry Co., Erie, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburg
Morgan Engineering Co., Alliance, O.
United Engineering & Fdry. First National Bank Bldg. Pittsburgh, Pa.

PRESSES (Forming and B
Cincinnati Shaper Co., Elam Garrard Sts., Cincinnati,

PRESSES (Hydraulic)
Birdsboro Steel Fdry. & Mac Birdsboro, Pa.
Chambersburg Engineering C Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc. 110 Main St., Ansonia, Co 344 Vulcan St., Buffalo,
Hannifin Mfg. Co., 621-631 Kolmar Ave., Chicago, Ill.
Logeman Brothers Co., 3126 leigh St., Milwaukee, Wis.
Mesta Machine Co., P. O. Box 1466, Pittsburgh,
Morgan Engineering Co., The Alliance, O.
Wood, R. D., Co., 400 Chestn Philadelphia, Pa.

PRESSES (Punching, Drawi Coining, Blanking, etc.)
Niagara Machine & Tool Wo 637-697 Northland Ave., Buffalo, N. Y.

WHERE-TO-BUY

(Riveting)
Mfg. Co., 621-631 So. Ave., Chicago, Ill.

(Scrap Bundling and
Brothers Co., 3126 Bur-, Milwaukee, Wis.

(Welding)—See
ERS

TE VESSELS
& Wilcox Co.,
or St., New York City.

ER GAS SYSTEMS—See RODUCER PLANTS

LS (For Blast Furnaces ltering Plants)
Vm. M., Co.,
gee Bldg., Pittsburgh, Pa.

S (Magnetic)
gnetic Separator Co.,
ith St., Milwaukee, Wis.
Magnetic Mfg. Co.,
28th St., Milwaukee, Wis.

IZERS
Pulverizer Co., 1249 nd Ave., St. Louis, Mo.

imers Mfg. Co.,
kee, Wis.
Hard Rubber Co.,
cer St., New York City.
achine Co.,
Box 1466, Pittsburgh, Pa.
Supply Co., Dallas, Texas.

(Boiler Feed)
ton Pump & Machinery Harrison, N. J.

(Centrifugal)
imers Mfg. Co.,
kee, Wis.
Hard Rubber Co.,
cer St., New York City.
s, Morse & Co.,
, Wabash Ave.,
o, Ill.
-Rand Co.,
adway, New York City.
Johnson Co.,
Mechanics St.,
n, Mich.
rton Pump & Machinery Harrison, N. J.

(Hydraulic)
Brothers Co., 3126 Bur- St., Milwaukee, Wis.
Inc., 1400 Oakman Blvd., t, Mich.
D., Co., 400 Chestnut hiladelphia, Pa.
gton Pump & Machinery Harrison, N. J.

(Rotary)
eo. D., Co.,
rd, Ill.
Inc., 1400 Oakman Blvd., t, Mich.

(Vacuum)
-Rand Co.,
adway, New York City.
gton Pump & Machinery Harrison, N. J.

ES (Multiple)
il Shaper Co., Elam and d Sts., Cincinnati, O.

NG AND SHEARING INERY
Machine & Mfg. Co.,
ond, Ind.
rsburg Engineering Co.,
bersburg, Pa.
d Punch & Shear Works,
St. Clair Ave., Cleveland, O.
tal Roll & Steel Fdry. Co.,
icago, Ind.
oundry & Machine Co.,
Box 1586, Pittsburgh, Pa.
Engineering Co., The,
ce, O.
Machine & Tool Works,
Northland Ave., Buffalo,

Machine Mfg. Co.,
urgh, Pa.
Engineering & Fdry. Co.,
National Bank Bldg.,
urgh, Pa.

ETER TUBES
Harris Co., Harrison, N. J.
Company, Worcester, Mass.

ETERS
n Gas Furnace Co.,
eth, N. J.

Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.

RAIL BREAKERS
National Roll & Foundry Co., The, Avonmore, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

RAILS (New and Relaying)
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.

RAILS (Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

RAMS
American Hollow Boring Co., 1054 W. 20th St., Erie, Pa.

REAMERS
Barber Colman Co., 150 Loomis St., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, O.
Greenfield Tap & Die Corp., Greenfield, Mass.

REAMERS (Pneumatic)
Ingersoll-Rand Co., 11 Broadway, New York City.

REAMERS (Sand, Ingot Mold—Pneumatic)
Ingersoll-Rand Co., 11 Broadway, New York City.

REBUILT EQUIPMENT
Marr-Galbreath Machinery Co., 53 Water St., Pittsburgh, Pa.
West Penn Machinery Co., 1208 House Bldg., Pittsburgh, Pa

RECEIVERS
Petroleum Iron Works Co., Sharon, Pa.
Pressed Steel Tank Co., Milwaukee, Wis.

RECORDERS (Combustion)
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

RECORDERS (Pressure, Speed, Temperature, Time)
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.

REDUCERS (Speed)—See SPEED REDUCERS

REDUCTION GEARS
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
344 Vulcan St., Buffalo, N. Y.
Horsburgh & Scott Co., The, 5114 Hamilton Ave., Cleveland, O.

REFRACTORIES (Fire Clay)
Babcock & Wilcox Co., 19 Rector St., New York City.
Eureka Fire Brick Co., 1100 B. F Jones Law Bldg., Pittsburgh, Pa.
Keagler Brick Co., 1443 W. Market St., Steubenville, O.
Quigley Company, Inc., 56 W. 45th St., New York City.

REFRACTORIES (For High Frequency Furnaces)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Carborundum Co., The, Perth Amboy, N. J.

REFRACTORIES (High Temperature)
Alpha-Lux Co., Inc., 192 Front St., New York City.
Quigley Company, Inc., 56 W. 45th St., New York City.

REFRACTORIES (Silica)
Alpha-Lux Co., Inc., 192 Front St., New York City.

REFRACTORIES (Silicon Carbide)
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.

RYERSON CERTIFIED STEELS
represent the highest quality obtainable in each class and type of material. All kinds from standard carbon grades to special alloys in stock for Immediate Shipment. Write for Stock List. Joseph T. Ryerson & Son, Inc. Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.
RYERSON

HIGH SPEED AND CARBON TOOL STEEL QUALITY UNEXCELLED
LATROBE ELECTRIC STEEL CO.
LATROBE PA.

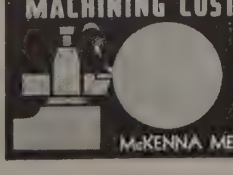
THE MARK "DARWIN" OF QUALITY
PIONEERS OF MODERN QUANTITY PRODUCTION
ALLOY – TOOL – STEELS
DARWIN & MILNER, INC. 1260 W. 4TH ST. CLEVELAND, O.

BARS • STRUCTURAL • PLATES • SHEETS
Write for PROMPT SERVICE
STOCK LIST "S"
THE LEVINSON STEEL COMPANY
PITTSBURGH
OFFICE—19 PRIDE STREET WAREHOUSE—20th & MERRIMAN STS

BELMONT IRON WORKS
PHILADELPHIA NEW YORK EDDYSTONE
Engineers - Contractors - Exporters
STRUCTURAL STEEL—BUILDINGS & BRIDGES
RIVETED—ARC WELDED
BELMONT INTERLOCKING CHANNEL FLOOR
Write for Catalogue
Main Office—Phila., Pa. New York Office—44 Whitehall St.

BROOKE PIG IRON
E. & G. BROOKE IRON CO.
BIRDSBORO, PENNA.
MFGRS OF HIGH GRADE
FOUNDRY
BASIC
GREY FORGE
MALLEABLE
BESSEMER
LOW PHOS.

STANCO
SEAMLESS - WELDED - BUTTED TUBING
Manufactured by
THE STANDARD TUBE CO.
DETROIT, MICH.
Eastern Representative:
Standard Tube Sales Corp., Maspeth, Long Island, New York

CUT DOWN MACHINING COSTS with KENNAMETAL

Will machine steel heat-treated up to 500 Brinell... Higher cutting speeds... Smoother finishes... Longer tool life.
Write for Catalogue
McKENNA METALS CO., 200 LLOYD AVE., LATROBE, PA.

REGULATORS (Pressure)
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

REGULATORS (Temperature)
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.

REINFORCEMENT FABRIC (Electric Welded)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Wickwire Spencer Steel Co., 41 E. 42nd St., New York City.

RESISTORS (Edgewound)
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.

RESISTORS (Graphite Disc)
Allen-Bradley Co., 1326 So. 2nd St., Milwaukee, Wis.

RHEOSTATS (Plating)
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

RINGS (Steel)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Commercial Forgings Co., 3710 E. 91st St., Cleveland, O.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
King Fifth Wheel Co., 5027 Beaumont Ave., Philadelphia, Pa.
Kropp Forge Co., 5301 W. Roosevelt Blvd., Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.

RINGS (Welded Steel)
King Fifth Wheel Co., 5027 Beaumont Ave., Philadelphia, Pa.

RINGS (Weldless) (*Also Stainless)
Commercial Forgings Co., 3710 E. 91st St., Cleveland, O.
*Midvale Co., The, Nicetown, Philadelphia, Pa.

RIVETERS (Hydraulic—Portable and Stationary)
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

RIVETERS (Jam, Pedestal, Staybolt, Squeeze, Stationary, Yoke—Pneumatic)
Ingersoll-Rand Co., 11 Broadway, New York City.

RIVETERS (Pneumatic)
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

RIVETING MACHINERY
Chambersburg Engineering Co., Chambersburg, Pa.
Shuster, F. B., Co., The, New Haven, Conn.
Tomkins-Johnson Co., 611 N. Mechanics St., Jackson, Mich.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

RIVETS (*Also Stainless)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Progressive Mfg. Co., Torrington, Conn.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
*Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, Pa.

RODS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)
American Brass Co., The, 25 Broadway, New York City.
Bridgeport Brass Co., Bridgeport, Conn.

RODS (Drill)
Firth-Sterling Steel Co., McKeesport, Pa.
Fitzsimons Co., The, 1623 Wilson Ave., Youngstown, O.
Kidd Drawn Steel Co., Aliquippa, Pa.

RODS (Piston)
American Hollow Boring Co., 1054 W. 20th St., Erie, Pa.

RODS (Rounds, Flats and Shapes) (*Also Stainless)
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
*Firth-Sterling Steel Co., McKeesport, Pa.
*Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. St., Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Timken Steel & Tube Co., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.
Youngstown Sheet & Tube Co., Youngstown, O.

RODS (Steel and Iron)
Firth-Sterling Steel Co., McKeesport, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.

RODS (Welding)—See WELDING RODS

RODS (Wire)—See WIRE PRODUCTS

ROLL COOLERS (Internal, Water)
Hunt, C. B., & Son, Salem, O.

ROLLERS (Rubber)
Goodyear Tire & Rubber Co., Akron, O.

ROLLING DOORS & SHUTTERS—SEE DOORS & SHUTTERS

ROLLING MILL BEARINGS—See BEARINGS (Rolling Mill)

ROLLING MILL EQUIPMENT
Aetna-Standard Engineering Co., The, Youngstown, O.
Alliance Machine Co., The, Alliance, O.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 344 Vulcan St., Buffalo, N. Y.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Fdry. & Mach. Co., P. O. Box 1586, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
Morgan Engineering Co., The, Alliance, O.
National Roll & Foundry Co., The, Avonmore, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

ROLLS (Magnetic)
Stearns Magnetic Mfg. Co., The, 650 So. 28th St., Milwaukee, Wis.

ROLLS (Sand and Chilled)
Aetna-Standard Engineering Co., The, Youngstown, O.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O.
Pittsburgh Rolls Corp., 41st and Willow Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

ROLLS (Steel and Iron)
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Commercial Forgings Co., 3710 E. 91st St., Cleveland, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 344 Vulcan St., Buffalo, N. Y.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Fdry. Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O.
Pittsburgh Rolls Corp., 41st and Willow Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

ROOFING AND SIDING (Corrugated and Plain)
American Rolling Mill Co., The, Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Sons, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

ROOFING (Plastic and Liquid)
Koppers Co., Tar & Chemical Div., Pittsburgh, Pa.

RUBBER GOODS (Mechanical)
Goodyear Tire & Rubber Co., Akron, O.
Rhoades, R. W., Metaline Co., 50 3rd St., Long Island City, N. Y.
United States Rubber Co., 1790 Broadway, New York City.

RUBBER PLUGS—See PLUGS

RUST PREVENTIVES
American Chemical Paint Co., Ambler, Pa.
Houghton, E. F., & Co., 240 W. Somerset St., Philadelphia, Pa.
Koppers Co., Tar & Chemical Div., Pittsburgh, Pa.
Stop-Rust Co., The, P. O. Box 494, Chattanooga, Tenn.

RUST PROOFING PROCESS
American Chemical Paint Co., Ambler, Pa.
Koppers Co., Tar & Chemical Div., Pittsburgh, Pa.
Stop-Rust Co., The, P. O. Box 494, Chattanooga, Tenn.

SAFE ENDS (Boiler Tube)
National Tube Co., Frick Bldg., Pittsburgh, Pa.

SAFETY DEVICES (Electric)
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

SALT TABLETS
Morton Salt Co., 208 W. Washington St., Chicago, Ill.

SAND CONDITIONING AND PREPARING MACHINERY
Dings Magnetic Separator Co., 675 Smith St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

SAWS (Hot and Cold)
Morgan Engineering Co., The, Alliance, O.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

SAWS (Inserted Tooth, Cold)
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS (Metal Cutting)
Simonds Saw & Steel Co., Fitchburg, Mass.
Youngstown Sheet & Tube Co., Youngstown, O.

SCALES
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland
Fairbanks, Morse & Co., Wabash Ave., Chicago,
Kron Co., The, Bridgeport,

SCALES (Dial)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland
Fairbanks, Morse & Co., Wabash Ave., Chicago,
Kron Co., The, Bridgeport,

SCALES (Monorail)
American MonoRail Co., The, 13107 Athens Ave., Cleveland
Cleveland Tramrail Div. of land Crane & Engineering, Wickliffe, O.
Kron Co., The, Bridgeport,
Shepard-Niles Crane & Hoist, Montour Falls, N. Y.

SCALING TOOLS (Pneumatic)
Ingersoll-Rand Co., 11 Broadway, New York

SCRAP BALING PRESSES—See BALING PRESSES

SCREENS AND SIEVES
Chicago Perforating Co., 2443 W. 24th Pl. Chicago
Erdle Perforating Co., 171 York St., Rochester,
Harrington & King Perforating, 5634 Fillmore St., Chicago
Koppers Co., Engineering & struction Div., Pittsburgh,
Wickwire Spencer Steel Co., 41 E. 42nd St., New York

SCREW EXTRACTORS
Greenfield Tap & Die Corp., Greenfield, Mass.

SCREW MACHINE PRODUCTS
Barnes, Wallace, Co., The, Associated Spring Corp., Bristol, Conn.
Hindley Mfg. Co., Valley Falls, R. I.
Progressive Mfg. Co., Torrington, Conn.
Titan Metal Mfg. Co., Bellefonte, Pa.

SCREW MACHINES (Automatic Single and Multiple Spindle
Brown & Sharpe Mfg. Co., Providence, R. I.

SCREW PLATES
Greenfield Tap & Die Corp., Greenfield, Mass.

SCREW STOCK—See STEEL (Screw Stock)

SCREWS
Cleveland Cap Screw Co., 2935 E. 79th St., Cleveland
Ohio Nut & Bolt Co., The, 600 Front St., Berea, O.
Parker-Kalon Corp., 200 Varick St., New York C
Progressive Mfg. Co., Torrington, Conn.

SCREWS (Cap, Set, Safety-S
Cleveland Cap Screw Co., 2935 E. 79th St., Cleveland
Standard Pressed Steel Co., Stewart Ave., & Kenmire S Jenkintown, Pa.

SCREWS (Cold Headed)
Cleveland Cap Screw Co., 2935 E. 79th St., Cleveland
Ohio Nut & Bolt Co., The, 600 Front St., Berea, O.

SCREWS (Conveyor)
Lee Spring Co. Inc., 30 Main St., Brooklyn, N. Y

SCREWS (Drive)
Parker-Kalon Corp., 200 Varick St., New York C

SCREWS (Hardened Self-Tapping)
Parker-Kalon Corp., 200 Varick St., New York C

SCREWS (Machine)
Ohio Nut & Bolt Co., The, 600 Front St., Berea, O.
Progressive Mfg. Co., Torrington, Conn.

SCREWS (Machine, Recessed H
American Screw Co., Providence, R. I.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, Cleveland, O.
National Screw & Mfg. Co., Cleveland, O.

(Machine, Recessed Con.
lon Corp.,
rk City.
g. Co., Chicago, Ill.
Burdsall & Ward Bolt & , Port Chester, N. Y.
g. Co., Waterbury, Conn.

(Sheet Metal, Recessed
Screw Co.,
nce, R. I.
Products Co.,
O.
al Screw Co.,
edford, Mass.
crew Corp.,
ritain, Conn.
Sessions Co., The,
nd, O.
Screw & Mfg. Co.,
nd, O.
alon Corp., New York City.
fg. Co., Chicago, Ill.
Burdsall & Ward Bolt & , Port Chester, N. Y.

(Socket, Cold Forged)
alon Corp.,
rick St., New York City.

(Socket, Head, Cap)
Pressed Steel Co.,
Ave., & Kenmire St.,
own, Pa.

(Thumb)
alon Corp.,
rick St., New York City.

(Wood, Recessed Head)
Screw Co.,
nce, R. I.
Products Co.,
O.
al Screw Co.,
edford, Mass.
crew Corp.,
ritain, Conn.
& Sessions Co., The,
nd, O.
Screw & Mfg. Co.,
nd, O.
fg. Co., Chicago, Ill.

SS STEEL TUBING—BES

TORS (Magnetic)
agnetic Separator Co.,
ith St., Milwaukee, Wis.
Controller & Mfg. Co.,
.. 79th St., Cleveland, O.
ctric Mfg. Co., The,
aurice Ave., Cleveland, O.
Magnetic Mfg. Co.,
. 28th St., Milwaukee, Wis.

TORS (Sand)
agnetic Separator Co.,
ith St., Milwaukee, Wis.
Magnetic Mfg. Co.,
. 28th St., Milwaukee, Wis.

HANGERS—See ERS (Shaft)

NG
n Hollow Boring Co.,
. 20th St., Erie, Pa.
Laughlin, Inc., Harvey, Ill.
cial Forgings Co.,
. 91st St., Cleveland, O.
Laughlin Steel Corp.,
& Laughlin Bldg.,
rgh, Pa.
Steel Products Co.,
Falls, Pa.
Jos. T., & Son, Inc.,
Rockwell Sts., Chicago,

l Steel Works Co.,
ll P. O., Philadelphia, Pa.
rawn Steel Co.,
ion, O.
Drawn Steel Co.,
National Bank Bldg.,
rgh, Pa.

(Clutch)
n Hollow Boring Co.,
W. 20th St., Erie, Pa.

TS
tti Shaper Co., Garrard and
Sts., Cincinnati, O.

(Steel)—See STEEL tural)

, SPECIAL (Steel)
Laughlin, Inc., Harvey, Ill.
-Illinois Steel Corp.,
rgh-Chicago.
a Steel Co.,
rancisco, Calif.
Laughlin Steel Corp.,
& Laughlin Bldg.,
rgh, Pa.
Steel Tank Co.,
ukee, Wis.
e Coal, Iron & Railroad Brown-Marx Bldg.,
ngham, Ala.
Drawn Steel Co.,
lon, O.

Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

SHEAR BLADES
American Shear Knife Co., 3rd and Ann Sts., Homestead, Pa.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.

SHEARS
Aetna-Standard Engineering Co., The, Youngstown, O.
Beatty Machine & Mfg. Co., Hammond, Ind.
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Fdry. & Mach. Co., P. O. Box 1586, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, 637 Northland Ave., Buffalo, N. Y.
Thomas Machine Mfg. Co., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

SHEET BARS
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., Youngstown, O.

SHEET CARRIERS
American MonoRail Co., The, 13107 Athens Ave., Cleveland, O.
Cullen-Friestedt Co., 1308 Kilbourn Ave., Chicago, Ill.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
J-B Engineering Sales Co., New Haven, Conn.

SHEET METAL PRODUCTS—See STAMPINGS

SHEET METAL WORKERS MACHINES
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Excelsior Tool & Machine Co., Ridge and Jefferson Aves., East St. Louis, Ill.
Niagara Machine & Tool Works 637 Northland Ave., Buffalo, N. Y.

SHEET STEEL ASSEMBLIES (Fabricated)
Budd, Edw. G., Mfg. Co., 25th St. & Huntington Park Ave., Philadelphia, Pa.

SHEET STEEL PILING (New and Used)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.

SHEETS (Acid Resisting)
International Nickel Co., Inc., The 67 Wall St., New York City.

SHEETS (Black)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Andrews Steel Co., The, Newport, Ky.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

SHEETS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)
American Brass Co., The, 25 Broadway, New York City.
Bridgeport Brass Co., Bridgeport, Conn.

SHEETS (Corrugated)
American Rolling Mill Co., The, Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS (Deep Drawing and Stamping)
Alan Wood Steel Co., Conshohocken, Pa.
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS (Electrical)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS (Galvanized)
American Rolling Mill Co., The, Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS (Hot Rolled and Hot Rolled Annealed)
Alan Wood Steel Co., Conshohocken, Pa.
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS (Long Terne)
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS (Perforated)
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.

SHEETS (Reinforced)
Erdle Perforating Co., 171 York St., Rochester, N. Y.

SHEETS (Roofing)—See ROOFING AND SIDING

SHEETS (Stainless)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, Middletown, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Massillon, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.

SHEETS (Stainless Clad)
Granite City Steel Co., Granite City, Ill.

SHEETS (Tin)—See TIN PLATE

SHEETS (Tin Mill Black)
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

SHEETS—HIGH FINISH (Automobile, Metal Furniture, Enameling)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.

SHEETS—HIGH FINISH—Con.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

SIEVES—See SCREENS AND SIEVES

SILICO-MANGANESE
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

SILICON METAL AND ALLOYS
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

SKELP (Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.

SLAG GRANULATING MACHINES (Blast Furnace and Open Hearth)
Brosius, Edgar E., Inc., Sharpsburg, Pa.

SMALL TOOLS
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, O.

SOAKING PITS
Amsler-Morton Co., Fulton Bldg., Pittsburgh, Pa.
Criswell, James, Co., Keenan Bldg., Pittsburgh, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

SOLVENT (Degreasing)
Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia, Pa.

SPACING TABLES
Thomas Machine Mfg. Co., Pittsburgh, Pa.

SPECIAL MACHINERY—See MACHINERY (Special)

SPEED REDUCERS
Cleveland Worm & Gear Co. 3249 E. 80th St., Cleveland, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 344 Vulcan St., Buffalo, N. Y.
Grant Gear Works, 2nd and B Sts., Boston, Mass.
Horsburgh & Scott Co., The, 5114 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1114 W. Monroe St., Chicago, Ill.
Jones, W. A., Fdry. & Mach. Co., 4401 W. Roosevelt Rd., Chicago, Ill.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.
New Departure Div., General Motors Corp., Bristol, Conn.

SPIEGELEISEN
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
New Jersey Zinc Co., 160 Front St., New York City.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

SPIKES (Screw)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., Youngstown, O.

SPINDLES (Lathe)
American Hollow Boring Co., 1054 W. 20th St., Erie, Pa.

SPLICE BARS (Rail)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.

SPRINGS (*Also Stainless)
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Duer Spring & Mfg. Co., Pittsburgh, Pa.
Hubbard, M. D., Spring Co., 613 Central Ave., Pontiac, Mich.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
Raymond Mfg. Co., Div. Associated Spring Corp., Corry, Pa.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.
Washburn Wire Co., Inc., 118th St. & Harlem River, New York City.
Wickwire Spencer Steel Co., 41 E. 42nd St., New York City.

SPROCKETS
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.

SPRUE CUTTERS
Shuster, F. B., Co., The, New Haven, Conn.

STACKS (Steel)—See BRIDGES, ETC.

STAINLESS STEEL—See BARS, SHEETS, STRIP, PLATES, ETC.

STAMPINGS
American Tube & Stamping Plant, (Stanley Wks.), Bridgeport, Conn.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Budd, Edw. G., Mfg. Co., 25th St. & Huntington Park Ave., Philadelphia, Pa.
Crosby Co., The, 183 Pratt St., Buffalo, N. Y.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Hubbard, M. D., Spring Co., 613 Central Ave., Pontiac, Mich.
Pressed Steel Tank Co., Milwaukee, Wis.
Raymond Mfg. Co., Div. Associated Spring Corp., Corry, Pa.
Stanley Works, The, New Britain, Conn.
Toledo Stamping & Mfg. Co., 99 Fearing Blvd., Toledo, O.
Whitehead Stamping Co., 1661 W. Lafayette Blvd., Detroit, Mich.

STAPLES (Wire)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Keystone Steel & Wire Co., Peoria, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

STARTERS (Electric Motor)
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

STEEL (Alloy)
Alan Wood Steel Co., Conshohocken, Pa.
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Firth-Sterling Steel Co., McKeesport, Pa.
Fitzsimons Co., The, 1623 Wilson Ave., Youngstown, O.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Simonds Saw & Mfg. Co., Fitchburg, Mass.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Timken Steel & Tube Co., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.

STEEL (Alloy, Cold Finished)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
LaSalle Steel Co., P. O. Box 6800-A, Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Union Drawn Steel Co., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Clad—Corrosion Resisting) (*Also Stainless)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
*Granite City Steel Co., Granite City, Ill.
Superior Steel Corp., Carnegie, Pa.

STEEL (Cold Drawn)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Kidd Drawn Steel Co., Aliquippa, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Union Drawn Steel Co., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Cold Finished)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Fitzsimons Co., The, 1623 Wilson Ave., Youngstown, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Union Drawn Steel Co., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Corrosion Resisting)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Firth-Sterling Steel Co., McKeesport, Pa.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chi
Jessop, Wm., & Sons, Inc., 121 Varick St., New Yor
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Irvine, Warren Co., Pa.
National Tube Co., Frick Bldg., Pittsburgh,
Republic Steel Corp., Dept. Cleveland, O.
Ryerson, Jos. T., & Son, Inc 16th & Rockwell Sts., Chic
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Superior Steel Corp., Carneg
Timken Steel & Tube Co., Canton, O.

STEEL (Die)
Allegheny Ludlum Steel Cor Oliver Bldg., Pittsburgh,
Jessop, Wm., & Sons, Inc., 121 Varick St., New York

STEEL (Drill)
Allegheny Ludlum Steel Corp Oliver Bldg., Pittsburgh,

STEEL (Electric)
Allegheny Ludlum Steel Cor Oliver Bldg., Pittsburgh,
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Firth-Sterling Steel Co., McKeesport, Pa.
Inland Steel Co., 38 So. Dearborn St., Chica
Jessop, Wm., & Sons, Inc., 121 Varick St., New York
Latrobe Electric Steel Co., Latrobe, Pa.
National Forge & Ordnance C Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. S Cleveland, O.
Timken Steel & Tube Co., Canton, O.

STEEL (High Speed)
Allegheny Ludlum Steel Corp Oliver Bldg., Pittsburgh, Pa
Bethlehem Steel Co., Bethlehem, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Jessop, Wm., & Sons Co., 121 Varick St., New York
Latrobe Electric Steel Co., Latrobe, Pa.

STEEL (High Tensile, Low A
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chica
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicag
Tennessee Coal, Iron & Railroa Brown Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., Youngstown, O.

STEEL (Nitriding)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.

STEEL (Rustless)—See STEEL (Corrosion Resisting)

STEEL (Screw Stock)
American Steel & Wire Co., Rockefeller Bldg., Cleveland,
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey,
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.

WHERE-TO-BUY

(Structural)—Con.
Steel Products Co.,
Falls, Pa.
Steel Corp., Dept. ST,
and, O.
Jos. T., & Son, Inc.,
Rockwell Sts., Chicago, Ill.
Drawn Steel Co.,
lon, O.
Drawn Steel Co.,
National Bank Bldg.,
urgh, Pa.
own Sheet & Tube Co., The,
stown, O.

(Spring)
n Steel & Wire Co.,
feller Bldg., Cleveland, O.
Laughlin Steel Corp.,
& Laughlin Bldg.,
urgh, Pa.
rn Wire Co.,
osdale, R. I.

(Stainless)—See STEEL osion Resisting)

(Strip, Copper Coated)
n Steel & Wire Co.,
efeller Bldg., Cleveland, O.
Works, The,
Britain, Conn.
eport, Conn.
Steel Co., Warren, O.

(Strip, Hot and Cold d)
o Stainless)
ny Ludlum Steel Corp.,
Bldg., Pittsburgh, Pa.
an Rolling Mill Co., The,
etown, O.
n Steel & Wire Co.,
efeller Bldg., Cleveland, O.
n Tube & Stamping Plant,
ley Wks.), Bridgeport, Conn.
s Steel Co., The,
ort, Ky.
em Steel Co.,
ehem, Pa.
e-Illinois Steel Corp.,
urgh-Chicago.
a Steel Co.,
Francisco, Calif.
Sterling Steel Co.,
esport, Pa.
Lakes Steel Corp.,
e, Detroit, Mich.
Steel Co.,
Dearborn St., Chicago, Ill.
Wm., & Sons, Inc.,
Varick St., New York City.
Steel Co.,
de Bldg., St. Louis, Mo.
ic Steel Corp., Dept. ST,
eland, O.
n, Jos. T., & Son, Inc.,
& Rockwell Sts., Chicago, Ill.
y Works, The,
Britain, Conn.
geport, Conn.
r Steel Corp., Carnegie, Pa.
see Coal, Iron & Railroad Co.
n Marx Bldg.,
ingham, Ala.
s Steel Co., Warren, O.
urn Wire Co.,
ipsdale, R. I.
n Steel Co., Weirton, W. Va
re Spencer Steel Co.,
42nd St., New York City.

(Strip, Tin Coated)
an Steel & Wire Co.,
efeller Bldg., Cleveland, O.
s Steel Co., The, Warren, O

(Strip, Zinc Coated)
an Steel & Wire Co.,
efeller Bldg., Cleveland, O.
s Steel Co., Warren, O.

(Structural)
so Stainless)
an Bridge Co.,
Bldg., Pittsburgh, Pa.
n Iron Works, 22nd St. and
hington Ave., Philadelphia, Pa.
hem Steel Co.,
lehem, Pa.
de-Illinois Steel Corp.,
burgh-Chicago.
bia Steel Co.,
Francisco, Calif.
Steel Co.,
o. Dearborn St., Chicago, Ill.
& Laughlin Steel Corp.,
s & Laughlin Bldg.,
burgh, Pa.
son Steel Co., The,
Pride St., Pittsburgh, Pa.
blic Steel Corp., Dept. ST,
eland, O.
Ryerson, Jos. T., & Son, Inc.,
16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co.,
Brown Marx Bldg.,
Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

STEEL (Tool)
Allegheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co.,
Bethlehem, Pa.
Bissett Steel Co., The,
900 E. 67th St., Cleveland, O.
Darwin & Milner, Inc.,
1260 W. 4th St., Cleveland, O.
Firth-Sterling Steel Co.,
McKeesport, Pa.
Jessop, Wm., & Sons Co.,
121 Varick St., New York City.
Kidd Drawn Steel Co.,
Aliquippa, Pa.
Latrobe Electric Steel Co.,
Latrobe, Pa.
Midvale Co., The, Nicetown,
Philadelphia, Pa.
Republic Steel Corp., Dept. ST,
Cleveland, O.
Ryerson, Jos. T., & Son, Inc.,
16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co.,
Brown Marx Bldg.,
Birmingham, Ala.

STEEL BUILDINGS—See BRIDGES, BUILDINGS, ETC.

STEEL DOORS & SHUTTERS—See DOORS & SHUTTERS

STEEL FABRICATORS—See BRIDGES, BUILDINGS, ETC.

STEEL PLATE CONSTRUCTION
American Bridge Co.,
Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div.,
The Koppers Co., Baltimore, Md.
Belmont Iron Works,
22nd St., and Washington Ave.,
Philadelphia, Pa.
Bethlehem Steel Co.,
Bethlehem, Pa.
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave.,
Philadelphia, Pa.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Petroleum Iron Works Co.,
Sharon, Pa.
Western Gas Div., The Koppers Co.,
Fort Wayne, Ind.

STELLITE
Haynes Stellite Co., Harrison and
Lindsay Sts., Kokomo, Ind.

STOKERS
Babcock & Wilcox Co.,
19 Rector St., New York City.

STOPPERS (Cinder Notch)
Bailey, Wm. M., Co.,
702 Magee Bldg., Pittsburgh, Pa
Brosius, Edgar E., Inc.,
Sharpsburg, Pa.

STORAGE BATTERIES—See BATTERIES (Storage)

STRAIGHTENING MACHINERY
Aetna-Standard Engineering Co.,
The, Youngstown, O.
Lewis Foundry & Machine Co.,
P. O. Box 1586, Pittsburgh, Pa.
Lewis Machine Co.,
3438 E. 76th St., Cleveland, O.
Logeman Brothers Co.,
3126 Burleigh St., Milwaukee, Wis.
Medart Co., The,
3500 de Kalb St., St. Louis, Mo.
Shuster, F. B., Co., The,
New Haven, Conn.
Sutton Engineering Co.,
Park Bldg., Pittsburgh, Pa.

SULPHURIC ACID
Cleveland-Cliffs Iron Co., Union
Commerce Bldg., Cleveland, O.
New Jersey Zinc Co.,
160 Front St., New York City.
Pennsylvania Salt Mfg. Co., 1000

BRASS CASTINGS BRONZE

Cadman Pittsburgh

One pound to two thousand pounds.

Specialists in the manufacture of Bridge Bronze, Phosphor Bronze, Bronzstox Bushings and Bars.

Capacity: sixteen thousand pounds per day.

A. W. Cadman Mfg. Co., Pittsburgh, Pa.
Established 1860

SMALL ELECTRIC STEEL CASTINGS
(Capacity 500 Tons Per Month)
WEST STEEL CASTING CO.
CLEVELAND **OHIO, U. S. A.**
"He Profits Most Who Serves Best"
Better Steel Castings

BLAST FURNACE
Copper Castings
- Blast Furnace Copper Castings
- Roll Neck Bearings
- Housing Nuts
- Machinery Castings
- Acid Resisting Castings
- Phosphorized Copper
- Hot Metal Ladle Car Bearings
- Locomotive and Car Journal Bearings
- Babbitt Metals

NATIONAL BEARING METALS CORP.
PITTSBURGH, PENNA.
Clearing Ill. (Chicago District) — Meadville, Pa.

H. A. BRASSERT & COMPANY
Consulting Engineers for IRON, STEEL, FUEL and HEAVY METALLURGICAL INDUSTRIES . . . . .
310 SOUTH MICHIGAN AVENUE · CHICAGO

CROSBY FOR STAMPINGS

All our efforts have been concentrated on one product - - STAMPINGS - - for more than 40 years. We have made stampings, deep, intricate, heavy, light, large and small, for nearly every branch of industry.

THE CROSBY COMPANY
Buffalo, N. Y.

SWITCHES (Electric)
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.
General Electric Vapor Lamp Co., 885 Adams St., Hoboken, N. J.

TACHOMETERS
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.

TANK LININGS
Quigley Company, Inc., 56 W. 45th St., New York City.

TANKS (Pickling)
American Hard Rubber Co., 11 Mercer St., New York City.
Goodyear Tire & Rubber Co., Akron, O.
United States Rubber Co., 1790 Broadway, New York City.

TANKS (Quenching, Automatic)
American Gas Furnace Co., Elizabeth, N. J.

TANKS (Storage, Pressure, Riveted, Welded)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div., The Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Petroleum Iron Works Co., Sharon, Pa.
Pressed Steel Tank Co., Milwaukee, Wis.
Western Gas Div., The Koppers Co., Fort Wayne, Ind.

TANKS—WOOD OR STEEL (Rubber or Lead Lined)
American Hard Rubber Co., 11 Mercer St., New York City.
Goodyear Tire & Rubber Co., Akron, O.
United States Rubber Co., 1790 Broadway, New York City.

TAPS AND DIES
Greenfield Tap & Die Corp., Greenfield, Mass.
Landis Machine Co., Inc., Waynesboro, Pa.

TERNE PLATE—See TIN PLATE

TESTING MACHINES (Moisture Tester)
Alpha-Lux Co., Inc., 192 Front St., New York City.

THERMOMETERS
Brown Isntrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.

THREAD CUTTING TOOLS
Landis Machine Co., Inc., Waynesboro, Pa.

TIE PLATES
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

TIN PLATE
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TIN PLATE MACHINERY
Aetna-Standard Engineering Co., The, Youngstown, O.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Wean Engineering Co., Warren, O.

TONGS (Rail Handling)
Cullen-Friestedt Co., 1308 Kilbourn Ave., Chicago, Ill.

TOOL BITS (High Speed)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.

TOOLS (Pneumatic)
Cleveland Punch & Shear Works, 3917 St. Clair Ave., Cleveland, O.
Ingersoll-Rand Co., 11 Broadway, New York City.

TOOLS (Precision, Lathe, Metal Cutting, etc.)
McKenna Metals Co., Steel Ave., Latrobe, Pa.

TOOLS (Tipped, Carbide)
McKenna Metals Co., Steel Ave., Latrobe, Pa.

TORCHES AND BURNERS (Acetylene, Blow, Oxy-Acetylene)
Air Reduction Sales Co., 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago, Ill.

TORCHES AND BURNERS (Air—Gas)
American Gas Furnace Co., Elizabeth, N. J.

TOWERS (Transmission)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.

TRACK ACCESSORIES
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

TRACK BOLTS
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TRAILERS (Arch-Girder)
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRAMRAILS
American MonoRail Co., The, 13107 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Yale & Towne Mfg. Co., 4530 Tacony St., Phi[illegible], Pa.

TRANSFORMERS
Wagner Electric Corp., 4904 Baum Blvd., Pittsburgh, Pa.

TRANSMISSIONS VARIABLE SPEED
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

TRAPS (Steam and Radiator)
Johns-Manville Corp., 22 E. 40th St., New York City.

TREADS (Safety)
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Dravo Corp., Machinery Div., Dravo Bldg., Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tri-Lok Co., Dravo Bldg., Pittsburgh, Pa.

TROLLEYS
American MonoRail Co., The, 13107 Athens Ave., Cleveland, O.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRUCKS AND TRACTORS (Electric Industrial)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Elwell-Parker Electric Co., The, 4501 St. Clair Ave., Cleveland, O.
Towmotor, Inc., 1247 E. 152nd St., Cleveland, O.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRUCKS AND TRACTORS (Gasoline Industrial)
Clark Tructractor Div., Clark Equipment Co., Battle Creek, Mich.
Elwell-Parker Electric Co., The, 4501 St. Clair Ave., Cleveland, O.
Towmotor, Inc., 1247 E. 152nd St., Cleveland, O.

TRUCKS (Dump-Industrial)
Towmotor, Inc., 1247 E. 152nd St., Cleveland, O.

TRUCKS (Hydraulic Lift)
Towmotor, Inc., 1247 E. 152nd St., Cleveland, O.

TRUCKS (Lift)
Clark Tructractor Div., Clark Equipment Co., Battle Creek, Mich.
Elwell-Parker Electric Co., The, 4501 St. Clair Ave., Cleveland, O.
Towmotor, Inc., 1247 E. 152nd St., Cleveland, O.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TUBE MILL EQUIPMENT
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.

TUBE MILL MACHINERY
Aetna-Standard Engineering Co., The, Youngstown, O.

TUBES (Boiler)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Babcock & Wilcox Co., 19 Rector St., New York City.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., Grant Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Standard Tube Co., The, 15020 Woodward Ave., Detroit, Mich.
Timken Steel & Tube Co., Canton, O.
Youngstown Sheet & Tube Co., Youngstown, O.

TUBES (Brass, Bronze, Copper, Nickel Silver)
American Brass Co., The, American Metal Hose Branch, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.

TUBING (Alloy Steel) (*Also Stainless)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
*Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
*National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., Grant Bldg., Pittsburgh, Pa.
Timken Steel & Tube Co., Canton, O.

TUBING (Cold Drawn Seamless Steel)
Columbia Steel Co., San Francisco, Calif.
National Tube Co., Frick Bl[illegible] Pittsburgh, Pa.
Pittsburgh Steel Co., Grant [illegible] Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc. & Rockwell Sts., Chicago,
Standard Tube Co., The, 150[illegible] Woodward Ave., Detroit,
Timken Steel & Tube Co., Canton, O.

TUBING (Copper, Brass, Aluminum)
Bundy Tubing Co., 10951 Hern Ave., Detroit, M[illegible]
Shenango-Penn Mold Co., Dov[illegible]

TUBING (Phosphor Bronze)
American Brass Co., The, American Metal Hose Branch Waterbury, Conn.

TUBING (Seamless Flexible)
American Brass Co., The, American Metal Hose Branch Waterbury, Conn.

TUBING (Welded Steel)
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mi[illegible]
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Tube Co., The, 1502[illegible] Woodward Ave., Detroit, M[illegible]
Youngstown Sheet & Tube Co., Youngstown, O.

TUMBLING BARRELS (Coke Testing)
Brosius, Edgar E., Inc., Sharpsburg, Pa.

TUNGSTEN CARBIDE
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, P[illegible]
Bissett Steel Co., The, 900 E. 67th St., Cleveland,
Haynes Stellite Co., Harrison a[illegible] Lindsay Sts., Kokomo, Ind.

TUNGSTEN CARBIDE (Tools and Dies)
Firth-Sterling Steel Co., McKeesport, Pa.

TUNGSTEN METAL AND ALL[illegible]
Electro Metallurgical Sales Cor[illegible] 30 E. 42nd St., New York Cit[illegible]

TURBINES (Steam)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. East Pittsburgh, Pa.

TURBO BLOWERS—See BLOW[illegible]
TURNTABLES
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland.

TURRET LATHES—See LAT[illegible] (Turret)

TWIST DRILLS
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, O
Greenfield Tap & Die Corp., Greenfield, Mass.

VALVES (Blast Furnace)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh,
Brosius, Edgar E., Inc., Sharpsburg, Pa.

VALVES (Control—Air and Hydraulic)
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

VALVES (Electrically Operated)
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.

VALVES (Gas and Air Reversing)
Blaw-Knox Co., Blawnox, Pa.
Wilputte Coke Oven Corp., 570 Lexington Ave., New York City.

VALVES (Gate)
American Chain & Cable Co., Bridgeport, Conn.
Bartlett-Hayward Div., The Koppers Co., Baltimore, Md.

...S (Gate)—Con.
...., The, 836 So. Michigan ... Chicago, Ill.
... Gas Div., The Koppers Co., ... Wayne, Ind.

...S (Gate—Rubber Lined)
...n Hard Rubber Co., ...rcer St., New York City.

...S (Hydraulic)
...o Steel Fdry. & Mach. Co., ...oro, Pa.
... Inc., 1400 Oakman Blvd., ...t, Mich.
... D., 400 Chestnut St., ...elphia, Pa.

...S (Hydraulic De-Scaling)
... B., & Son, Salem, O.

...S (Steam and Water)
...n Chain & Cable Co., ...eport, Conn.

...S AND FITTINGS—See FITTINGS

...IUM
... Metallurgical Sales Corp., 42nd St., New York City.

...CTS (Steel)—See BRIDGES, ...

...WAYS—See FLOORING—...L

...ERS (Iron and Steel)
...d, M. D., Spring Co., ...Central Ave., Pontiac, Mich.
... Malleable Castings Co., ..., Ill.

...ERS (Electric—Arc, Spot, ..., Flash, Butt, Automatic ...ction, Hydromatic, Etc.)
...chfeger Corp., 4411 W. Na- ...l Ave., Milwaukee, Wis.
... Electric Co., The, ...land, O., Dept. 20-4.
...son-Gibb Electric Welding ... Lynn, Mass.
... Equipment & Supply Co., ... E. Grand Blvd., Detroit, Mich.

...ING
...tt-Hayward Div., The Kop- ... Co., Baltimore, Md.
... Edw. G., Mfg. Co., ...St. & Huntington Park Ave., ...delphia, Pa.
... Electric Co., The, ...eland, O., Dept. 20-4.
...n Gas Div., The Koppers ... Fort Wayne, Ind.

...ING AND CUTTING ...ARATUS AND SUPPLIES ...tric)
... Electric Co., ...nectady, N. Y.
...chfeger Corp., 4411 W. Na- ... Ave., Milwaukee, Wis.
... Electric Co., The, ...land, O., Dept. 20-4.
...al Cylinder Gas Co., ...W. Wacker Dr., Chicago, Ill.
...son-Gibb Electric Welding ... Lynn, Mass.
... Welder & Metals Co., ... 42nd St., New York City.
...g Equipment & Supply Co., ... E. Grand Blvd., Detroit, Mich.
...ghouse Electric & Mfg. Co., ... Pittsburgh, Pa.

...ING AND CUTTING ...ARATUS AND SUPPLIES ...-Acetylene)
...eduction Sales Co., ... 42nd St., New York City.
... Air Products Co., The, ... 42nd St., New York City.
...al Cylinder Gas Co., ...W. Wacker Dr., Chicago, Ill.
...g Equipment & Supply Co., ... E. Grand Blvd., Detroit, Mich.

...DING RODS (Alloys)
...chfeger Corp., 4411 W. ...ional Ave., Milwaukee, Wis.
... Electric Co., The, ...eland, O., Dept. 20-4.
...th, Inc., 7311 Union Ave., ...eland, O.
... & Thermit Corp., ... Broadway, New York City.
...g Equipment & Supply Co., ... E. Grand Blvd., Detroit, Mich.

...DING RODS (Bronze)
...g Equipment & Supply Co., ... E. Grand Blvd., Detroit, Mich.

WELDING RODS OR WIRE
Air Reduction Sales Co., 60 East 42nd St., New York City.
American Brass Co., The, 25 Broadway, New York City.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bridgeport Brass Co., Bridgeport, Conn.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O., Dept. 20-4.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
Maurath, Inc., 7311 Union Ave., Cleveland, O.
Metal & Thermit Corp., 120 Broadway, New York City.
Page Steel & Wire Co., Monessen, Pa.
Pittsburgh Steel Co., Grant Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Washburn Wire Co., Phillipsdale, R. I.
Welding Equipment & Supply Co., 2720 E. Grand Blvd., Detroit, Mich.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 41 E. 42nd St., New York City.
Wilson Welder & Metals Co., 60 East 42nd St., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WHEELS (Car and Locomotive)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.

WHEELS (Track)
National-Erie Corp., Erie, Pa.

WINCHES (Electric)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

WIRE (Alloy Steel) (*Also Stainless)
*Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Firth-Sterling Steel Co., McKeesport, Pa.
Page Steel & Wire Co., Monessen, Pa.
*Pittsburgh Steel Co., Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Wickwire Spencer Steel Co., 41 E. 42nd St., New York City.

WIRE (Annealed, Bright, Galvanized)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Page Steel & Wire Co., Monessen, Pa.
Pittsburgh Steel Co., Grant Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 41 E. 42nd St., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE (Barb)
Bethlehem Steel Co., Bethlehem, Pa.
Pittsburgh Steel Co., Grant Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE (Brass)
Titan Metal Mfg. Co., Bellefonte, Pa.

WIRE (Cold Drawn)
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Pittsburgh Steel Co., Grant Bldg., Pittsburgh, Pa.

WIRE (Heat Resisting)
Driver-Harris Co., Harrison, N. J.

WIRE (High Carbon)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., Grant Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Washburn Wire Co., Inc., 118th St. and Harlem River, New York City.

WIRE (Music)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Washburn Wire Co., Inc., 118th St. and Harlem River, New York City.
Wickwire Spencer Steel Co., 41 E. 42nd St., New York City.

WIRE (Round, Flat, Square, Special Shapes)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., Los Angeles, Calif.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Washburn Wire Co., Inc., 118th St. and Harlem River, New York City.
Wickwire Spencer Steel Co., 41 E. 42nd St., New York City.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE (Spring)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., Grant Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

WIRE (Stainless)
Firth-Sterling Steel Co., McKeesport, Pa.
Pittsburgh Steel Co., Grant Bldg., Pittsburgh, Pa.

WIRE (Threaded)
Progressive Mfg. Co., Torrington, Conn.

WIRE (Welding)—See WELDING RODS OR WIRE

WIRE AND CABLE (Electric)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Anaconda Wire & Cable Co., 25 Broadway, New York City.

WIRE BUGGIES
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

WIRE CLOTH
Cyclone Fence Co., Waukegan, Ill.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 41 E. 42nd St., New York City.

WIRE FORMS, SHAPES AND SPECIALTIES
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Firth-Sterling Steel Co., McKeesport, Pa.
Hubbard, M. D., Spring Co., 613 Central Ave., Pontiac, Mich.

WIRE MILL EQUIPMENT
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Lewis Machine Co., 3438 E. 76th St., Cleveland, O.
Morgan Construction Co., Worcester, Mass.
Shuster, F. B., Co., The, New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

WIRE NAILS—See NAILS

WIRE PRODUCTS (*Also Stainless)
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Hubbard, M. D., Spring Co., 613 Central Ave., Pontiac, Mich.
*Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis, Mo.
Page Steel & Wire Co., Monessen, Pa.
Pittsburgh Steel Co., Grant Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Washburn Wire Co., Inc., 118th St. and Harlem River, New York City.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 41 E. 42nd St., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE ROPE AND FITTINGS (*Also Stainless)
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis, Mo.
Page Steel & Wire Co., Monessen, Pa.
Wickwire Spencer Steel Co., 41 E. 42nd St., New York City.

WIRE ROPE SLINGS
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis, Mo.

WIRE STRAIGHTENING AND CUTTING MACHINERY
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Lewis Machine Co., 3438 E. 76th St., Cleveland, O.
Shuster, F. B., Co., The, New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

ZINC (Rolled Sheets, Strips, Coils)
New Jersey Zinc Co., 160 Front St., New York City.

ZINC SLABS (High Grade)
St. Joseph Lead Co., 250 Park Ave., New York City.

ZINC SLABS (Spelter)
New Jersey Zinc Co., 160 Front St., New York City.

ZIRCONIUM METAL AND ALLOYS
Electro Metallurgical Sales Co., 30 E. 42nd St., New York City.

MALLEABLE IRON Castings

Detachable and Riveted Sprocket Chain, Malleable Washers, Tank Lugs, Oarlocks. Catalogues on request.

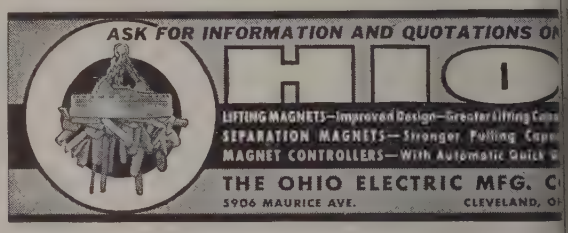
PEORIA MALLEABLE CASTINGS CO
PEORIA, ILLINOIS, U.S.A.

ATLAS
DROP FORGINGS
All shapes and sizes to 500 lbs.
ANY ALLOY STEEL · LABORATORY CONTROLLED
ATLAS DROP FORGE CO · LANSING, MICHIGAN

FORGINGS
HAMMERED STEEL FORGINGS
up to 6,000 lbs. each
ALL TYPES
Smooth Forged Finished — Rough Turned Hollow Bored
and Heat Treated to Specifications
CRANK SHAFTS, CONNECTING RODS, SHAFTING
Roll—Gear Blanks—Pinions and Miscellaneous Forgings
BAY CITY FORGE CO.
ERIE, PA.
Over a Quarter of a Century of Dependable Service and Quality Products

WHITEHEAD
Est. 1903
A Good Name to Write on Your STAMPING Orders!
A lot of big-name manufacturers have been doing it during these past 36 years. May we add your name?
Save Money on **WASHERS**—Special and Standard Sizes from our own dies. Send for catalog.
WHITEHEAD STAMPING CO.
1667 West Lafayette Blvd. Detroit, Mich.

POLISHING STAINLESS SHEETS
BY THE EXCELSIOR METHOD IS RELIABLE AND ECONOMICAL
EXCELSIOR TOOL & MACHINE CO
East St. Louis, Illinois



Now . . . you can secure an up-to-date treatise on the zinc coating of metals, entitled

HOT-DIP GALVANIZING PRACTICE

By W. H. Spowers Jr.

Just Published

45 Illustrations
4 Tables
7 Charts

Especially noteworthy is the 61-page Bibliography of articles on the subject of galvanizing.

This 200-page book, just published, gives full and carefully reasoned explanations of the why and wherefore of galvanizing. All the latest methods and processes are described and very copiously illustrated by a large number of diagrams and photographs.

The author, W. H. Spowers Jr., a mechanical and metallurgical engineer, long identified with the galvanizing industry as an operator and consultant has sought to gather and make known an array of facts on zinc coatings of steel that will appeal to tnose who daily are engaged in surfacing metals with zinc.

The demand for a work which would give reliable information on modern hot-dip processes for protecting iron and steel from corrosion has finally been met by the publication of HOT-DIP GALVANIZING PRACTICE.

Highly recommended to the man on the kettle, the designer of galvanizing plants, the metallurgists, as well as to those who zinc coat steel commodities and containers, etc.

ORDER YOUR COPY TODAY !...PRICE $4.00 POSTPAID

THE PENTON PUBLISHING COMPANY
Book Department
1213 W. Third St., Cleveland, Ohio

Enclosed is $4.00 for which please send postpaid, one copy of HOT-DIP GALVANIZING PRACTICE, by W. H. Spowers Jr., just published.

Date.....
NAME .....
ADDRESS .....
CITY..... STATE.....

Classified

HELP WANTED
Single Insertion—50c per line
Three to Six Insertions—48c per line
Six or more Insertions—45c per line

Seven words of ordinary length make a line.
FIRST LINE IN BOLD FACE TYPE
A box number address counts as one line.

POSITIONS WANTED
Single Insertion—25c per line
Three to Six Insertions—24c per line
Six or more Insertions—23c per line

Positions Wanted

ROIT MANUFACTURERS' REPRE-
TATIVE WELL ESTABLISHED AND
NCED, WILL TAKE ON ADDITION-
LINES NOW, SELLING LEADING
OR, REFRIGERATION AND AVIA-
N INDUSTRIES IN THIS TERRI-
Y. ADDRESS BOX 891, STEEL, PEN-
BLDG., CLEVELAND.

EL SALESMAN, TWENTY-EIGHT
s of age, well educated, seven years
experience, with successful record
to investigation, seeks sales position
reliable steel company or allied line.
ess Box 892, STEEL, Penton Bldg.,
eland.

STANT METALLURGIST, YOUNG,
e, B. S. in engineering. Post-graduate
in X-ray. Two years experience in
s and spectroscopy. Best suited for
rch in control or teaching. Address
890, STEEL, Peoples Gas Bldg.,
igo.

CHASING AGENT. TEN YEARS
essful buying all requirements of firm
ing heavy machinery, both standard
and specials to order. In charge of
s and plant maintenance. Versed in
and foundry practice, mechanical
rience. Age 34, college. Address Box
STEEL, Penton Bldg., Cleveland.

ES ENGINEER WELL KNOWN IN
AL INDUSTRY IN PHILADELPHIA
RITORY NOW HANDLING PRODUC-
N MACHINERY MADE BY A MANU-
TURER WITH ENVIABLE PRESTIGE
LD LIKE TO ADD ONE LINE IF
LINE WOULD MAINTAIN SAME
STIGE. WORK IS NOW SO ORGAN-
THAT BETTER THAN 50% OF HIS
IS AVAILABLE. Address Box 885,
EL, Penton Bldg., Cleveland.

EMICAL AND METALLURGICAL ENGINEER
employed, is available upon reason-
notice. 18 years experience in labo-
y, plant, sales service and production.
ly recommended. Address Box 883,
EL, Penton Bldg., Cleveland.

ALLURGIST DESIRES TECHNICAL
position. Employed, and for the past
years, by nationally prominent manu-
rer. Experienced in all phases of
treating, physical testing, processing,
lication, application and production of
carbon, alloy and tool steels.
ress Box 889, STEEL, Penton Bldg.,
eland.

UFACTURER'S AGENT, 20 YEARS
rience selling steel to manufacturers
diana, desires to represent mill manu-
uring strip sheet on commission basis.
furnish satisfactory references. Ad-
s Box 875, STEEL, Penton Bldg.,
eland.

YOU GETTING YOUR SHARE OF
s in the Mahoning Valley and Cleve-
? If not, you need live, aggressive
esentation. Let me show you what
be done with an industrial or mainte-
e product of merit. Commission basis.
ress Box 886, STEEL, Penton Bldg.
eland.

MANUFACTURERS AGENT
blished clientele Michigan and North-
ern Ohio. Desires additional produc-
line—preferably forgings, plastics,
npings, malleable or die castings. Grad-
mechanical engineer. Address Box
STEEL, Penton Bldg., Cleveland.

Employment Service

SALARIED POSITIONS
$2,500 to $25,000

This thoroughly organized advertising service of 29 years' recognized standing and reputation, carries on preliminary negotiations for positions of the caliber indicated above, through a procedure individualized to each client's personal requirements. Several weeks are required to negotiate and each individual must finance the moderate cost of his own campaign. Retaining fee protected by refund provision as stipulated in our agreement. Identity is covered and, if employed, present position protected. If your salary has been $2,500 or more, send only name and address for details. R. W. Bixby, Inc., 110 Delward Bldg., Buffalo, N. Y.

Help Wanted

SALES ENGINEER
experienced in selling hydraulic or special machinery. State qualifications. Inquiries treated in strict confidence. Address Box 893, STEEL, Penton Bldg., Cleveland.

JUNIOR SALESMAN EXPERIENCED stainless steel bars and wire with connections in Ohio. Address Box 884, STEEL, Penton Bldg., Cleveland.

Opportunities

ATTENTION!
MILL AND FOUNDRY EQUIPMENT COMPANIES
DO YOU GET 100% RESULTS ON YOUR SALES EFFORTS?
IF NOT
LET US REPRESENT YOU
WE ARE PREPARED TO PLACE YOUR PRODUCTS BEFORE THE BUYERS IN AN INTELLIGENT AND CONVINCING WAY.
YOU WILL GET THE BENEFIT OF OUR TWENTY YEARS' EXPERIENCE IN CONTACTING STEEL MILLS AND FOUNDRIES.
WRITE FOR FULL PARTICULARS, TO
FERDINAND G. SCHULTZ CO.
215 Questend Ave.,
Mt. Lebanon,
Pittsburgh, Pa.

WE ARE LOOKING FOR A specialty requiring electric steel or alloy steel castings, weighing from 5 to 150 lbs., to resist abrasion, heat, or corrosion.

Address Box 882, STEEL,
Penton Bldg., Cleveland

Equipment For Sale

STEEL CLOTHES LOCKERS
SACRIFICE
Here is your opportunity for a wonderful buy. Due to an export cancellation we have acquired several thousand NEW all steel Clothes Lockers, size 12x15x66" overall, in sections of three wide, shipped erected, welded in one piece, padlock attachment only. Price $3.97 each f.o.b. New York. With Padlocks, solid base, olive green. We advise you to wire your order, for these are selling fast.
NEW YORK MACHINERY CO.
730 Sixth Avenue **New York, N. Y.**

PRESS
95-E. Toledo Tie-Rod, Double Crank, bed 84"x42", stroke 10", die space 15", friction clutch, for motor drive and independent motor adjustment of ram, with spring knock-out attachment.
Excellent condition. Fob. Chicago
MARR-GALBREATH MACHINERY CO.
53 Water Street **Pittsburgh, Pa.**

Rails—"1 Ton or 1000"
NEW RAILS—5000 tons—All Sections—All Sizes.
RELAYING RAILS—25,000 tons—All Sections—All Sizes, practically as good as New.
ACCESSORIES—Every Track Accessory carried in stock—Angle and Splice Bars, Bolts, Nuts, Frogs, Switches, Tie Plates.
Buy from One Source—Save Time and Money
'Phone, Write, or Wire
L. B. FOSTER COMPANY, Inc.
PITTSBURGH NEW YORK CHICAGO

FOR SALE
Used small foundry equipment. Tabor, Nichols and International Molding Machines, American and Sturtevant blowers and fans, wood and iron flasks, tote boxes and trays, and miscellaneous equipment. Priced very low. Art Young, 603 West 12th St., Erie, Pa. Phone 26-431.

Castings

OHIO

THE WEST STEEL CASTING CO., Cleveland. Fully equipped for any production problem. Two 1½ ton Elec. Furnaces. Makers of high grade light steel castings, also alloy castings subject to wear or high heat.

PENNSYLVANIA

NORTH WALES MACHINE CO., INC., North Wales. Grey Iron, Nickel, Chrome, Molybdenum Alloys. Semi-steel. Superior quality machine and hand molded sand blast and tumbled.

Metal Finishing

PENNSYLVANIA

PHILADELPHIA RUST-PROOF CO., 3229 Frankford Ave., Philadelphia. Electroplating; cadmium; tin; zinc; chromium; copper; nickel and silver; Anodizing of Aluminum by Alumilite process Parkerizing; Sherardizing; Bonderizing.

✦ ✦ ADVERTISING INDEX ✦ ✦

Where-to-Buy Products Index carried in first issue of month.

Page

A

Abrasive Co., Division of Simonds Saw & Steel Co. —
Acme Galvanizing, Inc. —
Acme Steel & Malleable Iron Works. . —
Adelphia Hotel —
Aetna-Standard Engineering Co. . . . . —
Ahlberg Bearing Co. —
Air Reduction Sales Co. —
Ajax Electric Co., Inc. 57
Ajax Electric Furnace Corp. 57
Ajax Electrothermic Corp. 57
Ajax Metal Co., The 57
Alan Wood Steel Co. —
Allegheny Ludlum Steel Corp. —
Allen-Bradley Co. —
Alliance Machine Co., The —
Allis-Chalmers Mfg. Co. —
Alpha-Lux Co., Inc., The —
American Brass Co., The —
American Bridge Co. —
American Chain & Cable Co., Inc., Ford Chain Block Division —
American Chain & Cable Co., Inc., Page Steel & Wire Division 86
American Chemical Paint Co. 101
American Engineering Co. —
American Gas Association —
American Gas Furnace Co. —
American Hammered Piston Ring Division of Koppers Co. —
American Hot Dip Galvanizers' Association —
American Metal Hose Branch of The American Brass Co. —
American Monorail Co. —
American Pulverizer Co. —
American Rolling Mill Co., The —
American Screw Co. —
American Shear Knife Co. —
American Solder & Flux Co. —
American Steel & Wire Co. 41
American Tinning & Galvanizing Co. . . —
Ampco Metal, Inc. —
Amsler-Morton Co., The —
Anaconda Wire & Cable Co. —
Andrews Steel Co. 77
Apollo Steel Co. —
Armstrong Cork Co. —
Atlantic Stamping Co. —
Atlas Car & Mfg. Co. 78
Atlas Drop Forge Co. 114

B

Babcock & Wilcox Co. —
Bailey, Wm. M., Co. —
Bantam Bearings Corp. —
Barber-Colman Co. —
Barnes, Wallace, Co., The, Division of Associated Spring Corporation —
Bartlett Hayward Division of Koppers Co. —
Bay City Forge Co. 114
Bellevue-Stratford Hotel 88
Belmont Iron Works 107
Benjamin Franklin Hotel —
Berger Manufacturing Div., Republic Steel Corp. —
Bethlehem Steel Co. 3
Birdsboro Steel Foundry & Machine Co. —
Bissett Steel Co., The 90
Blaw-Knox Co. —
Blaw-Knox Division, Blaw-Knox Co. . . —
Blaw-Knox Sprinkler Div., Blaw-Knox Co. —
Bliss & Laughlin, Inc. —
Brassert, H. A., & Co. 111
Bridgeport Brass Co. 43, 44
Brooke, E. & G., Iron Co. 107
Brookmire Corporation —
Boston Tow Boat Co. —
Brosius, Edgar E., Inc. —
Brown & Sharpe Mfg. Co. 47
Brown Instrument Co., The —

Page

Buffalo Galvanizing & Tinning Works, Inc. —
Bullard Co., The —
Bundy Tubing Co. —

C

Cadman, A. W., Mfg. Co. 111
Carborundum Co., The —
Carnegie-Illinois Steel Corp. —
Carter Hotel 101
Cattie, Joseph P., & Bros., Inc. —
Chain Belt Co. 7
Chain Products Co. —
Chambersburg Engineering Co. —
Chandler Products Co. —
Chicago Perforating Co. —
Chicago Rawhide Mfg. Co. —
Cincinnati Grinders, Inc. —
Cincinnati Milling Machine Co. —
Cincinnati Shaper Co., The —
Clark Controller Co. —
Clark Tructractor, Div. Clark Equipment Co. —
Cleveland Cap Screw Co. —
Cleveland-Cliffs Iron Co. —
Cleveland Crane & Engineering Co. . . —
Cleveland Hotel —
Cleveland Punch & Shear Works Co., The 12
Cleveland Tramrail Division, Cleveland Crane & Engineering Co. —
Cleveland Twist Drill Co. 10
Cleveland Worm & Gear Co., The . . —
Climax Molybdenum Co. 28
Colonial Steel Co. —
Columbia Steel Co. 41
Columbian Steel Tank Co. —
Columbus Die, Tool & Machine Co. 103
Continental Roll & Steel Foundry Co. —
Continental Screw Co. —
Corbin Screw Corp. —
Cowles Tool Co. —
Crane Co. —
Criswell, James, Co. —
Crocker-Wheeler Electric Mfg. Co. . . . —
Crosby Co., The 111
Cullen-Friestedt Co. —
Curtis Pneumatic Machinery Co. . . . —
Cyclone Fence Co. —

D

Damascus Steel Casting Co. —
Darwin & Milner, Inc. 107
Detroit Leland Hotel 94
Diamond Expansion Bolt Co., Inc. . . —
Dravo Corp., Machinery Division . . . —
Driver-Harris Co. —
Duer Spring & Mfg. Co. —

E

Eastern Gas & Fuel Associates . . . . . —
Edison, Thomas A., Inc. —
Electric Controller & Mfg. Co. . . . . Back Cover
Electric Furnace Co., The 89
Electric Storage Battery Co. 49
Electrochemical Processes Division Blaw-Knox Co. —
Electro Metallurgical Co. —
Elwell-Parker Electric Co. —
Engineering & Construction Division of Koppers Co. —
Enterprise Galvanizing Co. —
Erdle Perforating Co. —
Erie Foundry Co. —
Eureka Fire Brick Works 97
Excelsior Tool & Machine Co. 114

F

Fafnir Bearing Co. —
Fairbanks, Morse & Co. 82
Fanner Mfg. Co., Inc. —
Farrel-Birmingham Co., Inc. —

Farval Corp., The . . . . .Inside Back
Federal Shipbuilding & Dry Dock
Finn, John, Metal Works
Firth-Sterling Steel Co.
Fitzsimons Co., The
Flinn & Dreffein Co.
Ford Chain Block Division of American Chain & Cable Co., Inc.
Foster, L. B., Inc.
Foxboro Co., The

G

Gas & Coke Division of Koppers
General Electric Co.
General Electric Co., Incandescent Lamp Dept.
General Electric Vapor Lamp Co
Gordon Lubricator Division, Bla Knox Co.
Granite City Steel Co.
Grant Gear Works
Great Lakes Steel Corp.
Greenfield Tap & Die Corp.
Gregory, Thomas, Galvanizing Wo
Gulf Oil Corporation
Gulf Refining Co.

H

Hagan Corporation, The
Hagan, George J., Co.
Halliden Machine Co., The
Hanlon-Gregory Galvanizing Co.
Hanna Furnace Corp.
Hannifin Mfg. Co.
Harnischfeger Corp.
Harrington & King Perforating C
Harris Structural Steel Co.
Harter Corp., The
Hays Corp., The
Heald Machine Co., The . . . . .Inside Front
Helmer-Staley, Inc.
Heppenstall Co.
Hevi-Duty Electric Co.
Hilliard Corp., The
Hillside Fluor Spar Mines
Hindley Mfg. Co.
Hodell Chain Co., The
Horsburgh & Scott Co.
Hubbard, M. D., Spring Co.
Hunt, C. B., & Son
Hunt, C. H.
Huther Bros. Saw Mfg. Co.
Hyatt Bearings Division, General Motors Sales Corporation
Hyde Park Foundry & Machine C

I

Independent Galvanizing Co.
Industrial Brownhoist Corp.
Ingersoll-Rand Co.
Inland Steel Co. .....Front Cover
International Acetylene Association
International Derrick & Equipment C
International Nickel Co., Inc.
Irwin, H. G., Lumber Co.

J

Jackson Iron & Steel Co., The
James, D. O., Mfg. Co.
J-B Engineering Sales Co.
Jessop, Wm., & Sons, Inc.
Johns-Manville Corp.
Jones & Laughlin Steel Corp.
Jones, W. A., Foundry & Machine Co
Joslyn Co. of California
Joslyn Mfg. & Supply Co.

K

Kardong Brothers, Inc.
Keagler Brick Co., The
Kemp, C. M., Mfg. Co.
Kidd Drawn Steel Co.
Kidde, Walter, & Co.

STE

ADVERTISING INDEX

Where-to-Buy Products Index carried in first issue of month.

Page

Fifth Wheel Co. ..... —
ar Manufacturing Co. ..... —
rs Co. .....
rs Coal Co., The ..... —
rs-Rheolaveur Co. ..... —
, L. O., & Brother, Inc. ..... —
Co., The 94
Forge Co. ..... —

L

le Steel Co. ..... —
City Malleable Co. ..... —
on & Sessions Co., The ..... —
s Machine Co., Inc. 6
s Tool Co. ..... —
be Electric Steel Co. 107
nd, R. K., Machine Tool Co., The —
& Northrup Co. ..... —
spring Co., Inc. 99
h Structural Steel Co. ..... —
len, A., & Sons Rope Co. ..... —
son Steel Co., The 107
Foundry & Machine Division of
w-Knox Co. ..... —
Machine Co., The 103
in Electric Co. ..... —
Air Products Co., The ..... —
muth, Lewis B. 92
Belt Co. 83
s Engineering Corp. 97
nann Bros. Co. ..... —

Mc

pin Hotel ..... —
y Machine Co. ..... —
nna Metals Co. 107

M

intosh-Hemphill Co. ..... —
-Galbreath Machine Co. 115
land Drydock Co., The ..... —
ews Conveyer Co. ..... —
ath, Inc. ..... —
rt Co., The ..... —
anite Metal Corp. ..... —
a Machine Co. ..... —
l & Thermit Corp. ..... —
ale Co., The ..... —
uri Rolling Mill Corp. ..... —
up Steel Products Co. ..... —
rch Steel Co. ..... —
an Construction Co. ..... —
an Engineering Co. ..... —
on Salt Co. ..... —
ic Iron Works ..... —
ic Steamship Co. ..... —

N

onal Alloy Steel Co. ..... —
onal Bearing Metals Corp. 111
onal-Erie Corp. ..... —
onal Forge & Ordnance Co ..... —
onal Lead Co. ..... —
onal Lumber & Creosoting Co. ..... —
onal Roll & Foundry Co. ..... —
onal Screw & Mfg. Co. ..... —
onal Steel Corp. 8
onal Telephone Supply Co., Inc. ..... —

onal Tube Co. ..... —
Departure, Division General Mo-
rs Corp. ..... —
England Coal & Coke Co. ..... —
Jersey Zinc Co. 31
York & New Jersey Lubricant Co. 79
ara Machine & Tool Works 55
Steel Products Div., Republic
el Corp. ..... —
na-Hoffmann Bearings Corp. ..... —
on Co., The ..... —

O

Electric Mfg. Co. 114
Ferro-Alloys Corp. ..... —

Page

Ohio Locomotive Crane Co. 103
Ohio Steel Foundry Co., The 4, 5
Oil Well Supply Co. ..... —
Oxweld Acetylene Co. ..... —

P

Page Steel & Wire Division of American Chain & Cable Co., Inc. 86
Parker-Kalon Corp. ..... —
Parkin, Wm. M., Co. ..... —
Penn Galvanizing Co. ..... —
Pennsylvania Industrial Engineers. . 97
Pennsylvania Salt Mfg. Co. ..... —
Peoria Malleable Castings Co. 114
Perkins, B. F., & Son, Inc. 80
Petroleum Iron Works Co. ..... —
Pheoll Mfg. Co. ..... —
Philadelphia Gear Works ..... —
Pittsburgh Crushed Steel Co. ..... —
Pittsburgh Lectromelt Furnace Corp. 91
Pittsburgh Rolls Division of Blaw-Knox Co. ..... —
Pittsburgh Steel Co. ..... —
Poole Foundry & Machine Co. 88
Power Piping Corp. ..... —
Pressed Steel Tank Co. ..... —
Prest-O-Lite Co., Inc., The ..... —
Progressive Mfg. Co. ..... —
Pure Oil Co., The 97

Q

Quigley Co., Inc. ..... —

R

Raymond Mfg. Co., Division of Associated Spring Corp. 99
Reliance Electric & Engineering Co. . . —
Republic Steel Corp. ..... —
Research Corp. ..... —
Rhoades, R. W., Metaline Co., Inc. . . —
Riverside Foundry & Galvanizing Co. —
Russell, Burdsall & Ward Bolt & Nut Co. 85
Ryerson, Joseph T., & Son, Inc. 107

S

St. Joseph Lead Co. ..... —
Salem Engineering Co. ..... —
Samuel, Frank, & Co., Inc. ..... —
San Francisco Galvanizing Works. . —
Sanitary Tinning Co., The ..... —
Scovill Mfg. Co. ..... —
Scully Steel Products Co. ..... —
Shafer Bearing Corporation 87
Shaw-Box Crane & Hoist Division, Manning, Maxwell & Moore, Inc. . . 103
Shell Union Oil Corporation ..... —
Shenango Furnace Co., The ..... —
Shenango-Penn Mold Co. ..... —
Shepard Niles Crane & Hoist Corp. . . 76
Shuster, F. B., Co., The 103
Simonds Gear & Mfg. Co. 97
Simonds Saw & Steel Co. ..... —
Sipe, James B., & Co. 101
SKF Industries, Inc. 118
Sleeper & Hartley, Inc. 97
Snyder, W. P., & Co. ..... —
Socony-Vacuum Oil Co., Inc. ..... —
Spowers, W. H., Jr. ..... —
Standard Galvanizing Co. ..... —
Standard Pressed Steel Co. ..... —
Standard Steel Works Co. ..... —
Standard Tube Co. 107
Stanley Works ..... —
Stearns Magnetic Mfg. Co. ..... —
Steel & Tubes, Inc. ..... —
Steel Founders' Society of America. . —
Stevens Hotel ..... —
Stewart Furnace Division, Chicago Flexible Shaft Co. 97
Stop-Rust Co., The ..... —
Strong Steel Foundry Co. ..... —
Sturtevant, B. F., Co. ..... —
Sun Oil Co. ..... —
Superior Steel Corp. ..... —

Page

Surface Combustion Corp. ..... —
Syracuse Hotel ..... —

T

Tar & Chemical Division of Koppers Co. ..... —
Tennessee Coal, Iron & Railroad Co. . . —
Thomas Machine Manufacturing Co. . . —
Thomas Steel Co., The ..... —
Thomson-Gibb Electric Welding Co. . . —
Tide Water Associated Oil Co. ..... —
Timken Roller Bearing Co. ..... —
Timken Steel & Tube Division, The Timken Roller Bearing Co. ..... —
Tinnerman Stove & Range Co. ..... —
Toledo Stamping & Mfg. Co. ..... —
Tomkins-Johnson Co. ..... —
Torrington Co., The ..... —
Towmotor, Inc. 93
Tri-Lok Co. ..... —
Truscon Steel Co. ..... —

U

Union Carbide & Carbon Corp. ..... —
Union Carbide Sales Co. ..... —
Union Drawn Steel Div., Republic Steel Corp. ..... —
Union Steel Castings Co. ..... —
United Engineering & Foundry Co. . . . —
United States Rubber Co. ..... —
United States Steel Corp., Subsidiaries 41
American Bridge Co.
American Steel & Wire Co.
Carnegie-Illinois Steel Corp.
Columbia Steel Co.
Cyclone Fence Co.
Federal Shipbuilding & Dry Dock Co.
National Tube Co.
Oil Well Supply Co.
Scully Steel Products Co.
Tennessee Coal, Iron & Railroad Co.
United States Steel Products Co.
Universal Atlas Cement Co.
Virginia Bridge Co.
United States Steel Products Co. 41
Universal Atlas Cement Co. ..... —

V

Valley Mould & Iron Corp. ..... —
Vickers, Inc. ..... —
Virginia Bridge Co. ..... —

W

Wagner Electric Corp. ..... —
Waldron, John, Corp. ..... —
Washburn Wire Co. 24
Washburn Wire Co., Inc. 24
Wean Engineering Co., Inc. ..... —
Weirton Steel Co. ..... —
Welding Equipment & Supply Co. ..... —
Wellman-Smith Owens Eng. Corp. Ltd. —
Western Precipitation Corp. ..... —
Westinghouse Electric & Mfg. Co. ..... —
West Penn Machinery Co. ..... —
West Steel Casting Co. 111
Whitcomb Locomotive Co., The, Div., The Baldwin Locomotive Works. ..... —
Whitehead Stamping Co. 114
White Tar Co. of New Jersey, Inc. ..... —
Wickwire Brothers ..... —
Wickwire Spencer Steel Co. ..... —
Wiggins, John B., Co. 101
Wilcox, Crittenden & Co., Inc. ..... —
Wilson, Lee, Engineering Co. ..... —
Wilson Welder & Metals Co., Inc. ..... —
Witt Cornice Co., The ..... —
Wood Preserving Corp., The ..... —
Worthington Pump & Machinery Corp. —
Worth Steel Co. 52
Wyckoff Drawn Steel Co. ..... —

Y

Yale & Towne Mfg. Co. ..... —
Youngstown Alloy Casting Corp. ..... —
Youngstown Sheet & Tube Co. ..... —

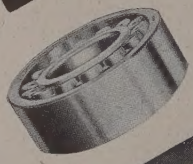
The bearings are *Protected*

COMPLETE PROTECTION—that's the job being done *all* day *every* day by these standard SKF Pillow Blocks. For years they have protected the bearings inside against dust, scale, and water. And for years they have received only routine inspection. Performance like this from standard pillow blocks means *economy in operation* added to *economy in original installation.*

No matter whether it's for some new installation or a change-over on an old one, take advantage of this type of simplified low-cost roller bearing unit. These pillow blocks are readily adaptable for use with a central lubricating system, and can be obtained for shafts up to 30" in diameter. Ask your nearest SKF representative for further information relating to sizes, prices, etc., or write direct. SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.

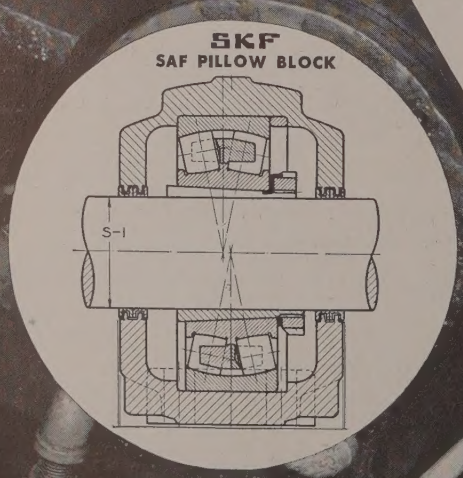
4322

SKF



BEARINGS

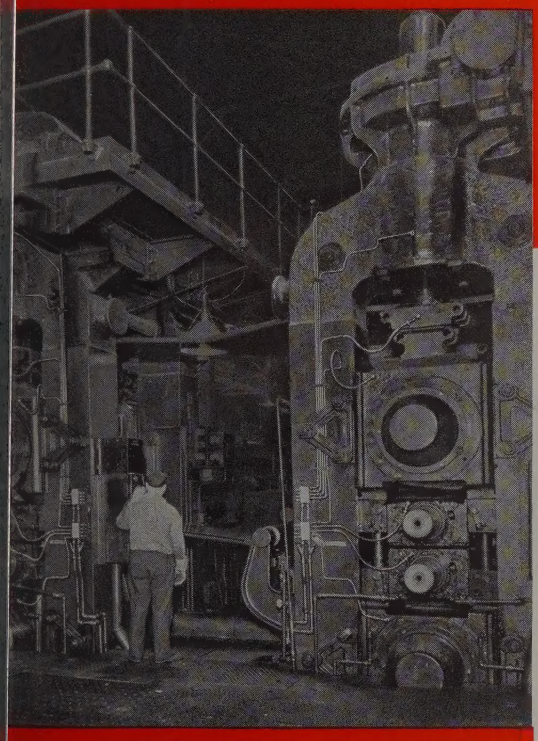
ROLLER

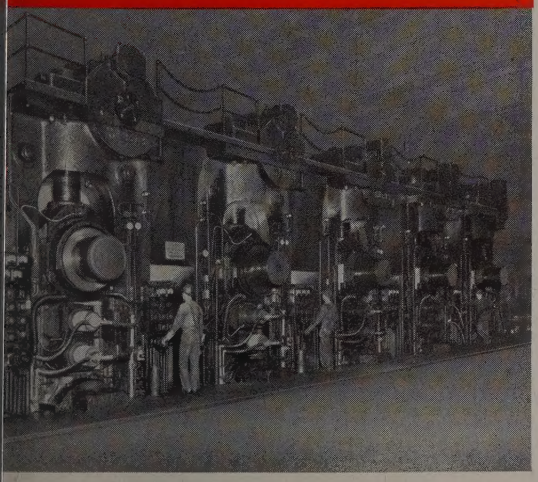


● *Table rollers be stands and at the fi end of a mid-Weste Continuous Hot Strip one of the first installa the SAF type SKF Blocks. SKF SAF type Blocks are also used cross shaft of transfer moving sheets across th ing beds.*

...in the South as in the North... FARVAL

PROVIDES PROTECTION FOR PRODUCTION SCHEDULES, BY PREVENTING MILL DELAYS DUE TO LACK OF PROPER LUBRICATION





● For the steel mill expansion in the South, Farval has been selected to insure dependable lubrication for both hot and cold mills—serving the blooming mill, manipulators, tables, shears, and hot strip roughing mill train.

Farval is also serving two 5-stand tandem cold mills, and nine 4-Hi temper pass mill stands. In addition, all of the miscellaneous equipment including two continuous pickling lines, eight tin plate shearing lines, levelers, pinch rolls, etc., are Farval-equipped.

Thus more than **2300 bearings** throughout the new mills are protected in advance against shutdowns, mill delays and maintenance expense.

The first installations of Farval in the South were made in 1930, and today in one plant alone 121 Systems serve more than **5300 bearings.**

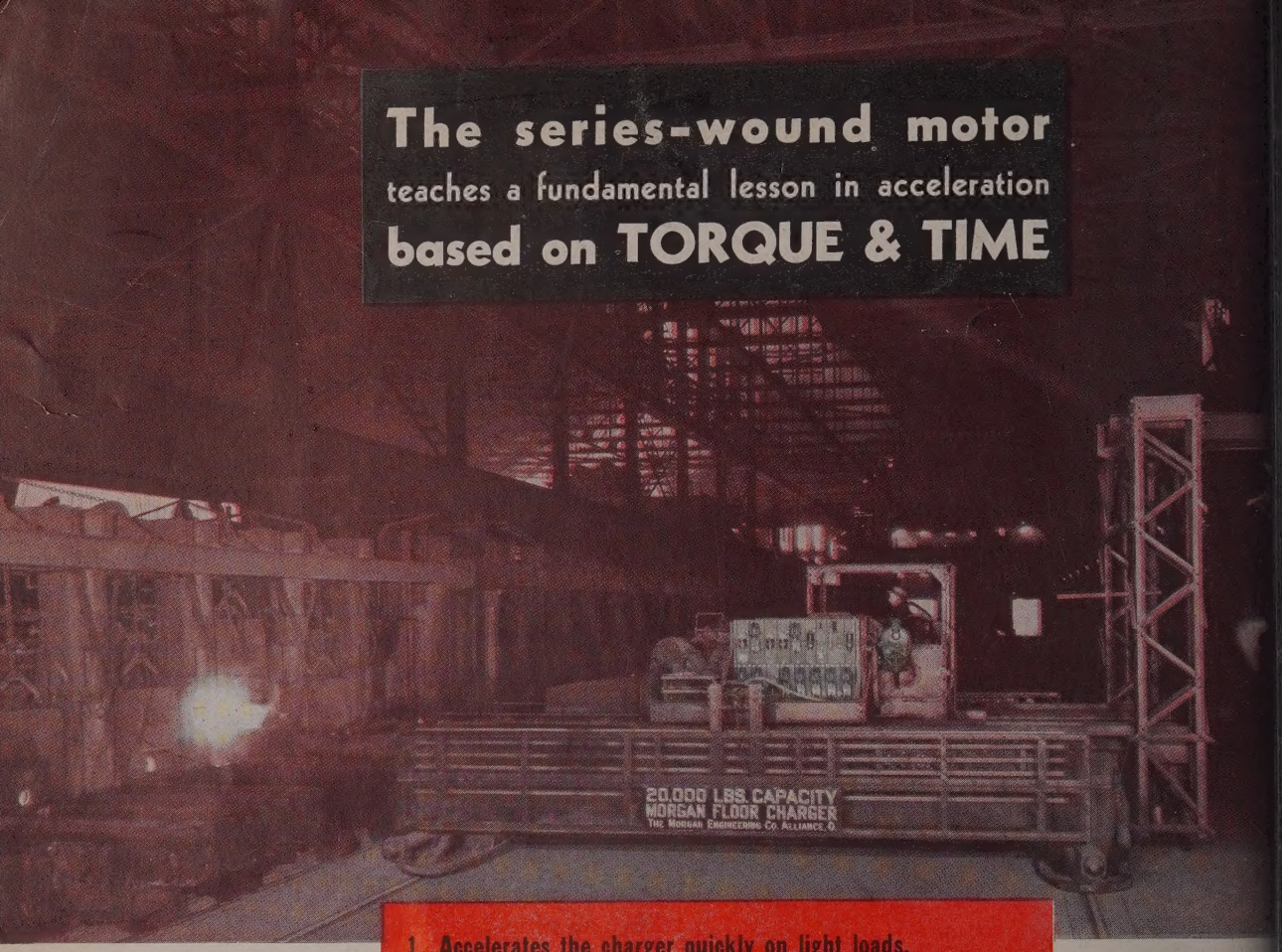
The Farval Centralized System will deliver clean lubricant under high pressure from one central station to a group of bearings, in exact measured quantities, and at regular intervals. Operation is constant and positive regardless of the number of bearings in the System—and not a bearing is missed. The Farval Corporation, 3270 East 80th St., Cleveland, Ohio.

Affiliate of The Cleveland Worm & Gear Company, Manufacturers of Automotive and Industrial Worm Gearing

SPECIAL
LIVERY TO
Every
BEARING

FARVAL
CENTRALIZED SYSTEMS OF LUBRICATION

The series-wound motor
teaches a fundamental lesson in acceleration
based on TORQUE & TIME

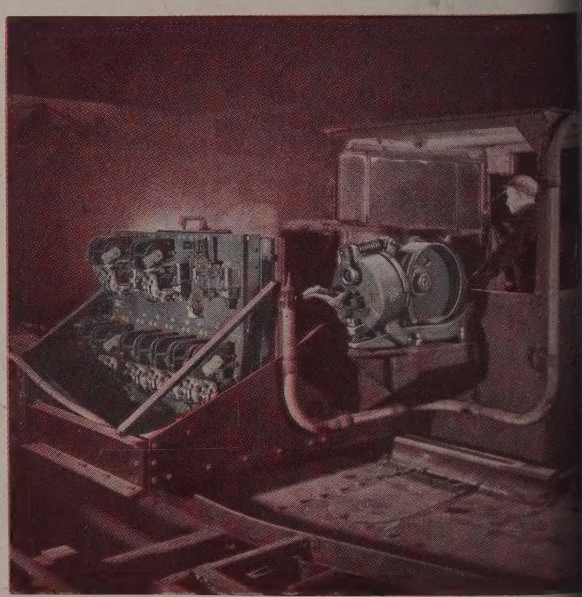


1. Accelerates the charger quickly on light loads.
2. Accelerates slower, but with more torque on heavier loads.
3. On overloads, speed further reduced—torque increased.

One of three 10-ton C
which are completely equ
Bulletin 920 Full M
Bulletin 1004-B Type
Bulletin 1184 Type A
Switches.

THE SERIES-WOUND Motor is recognized for its ability to adjust itself to the load. On the bridge motion of this charging machine, for example, the series motor accelerates the charger quickly on a light load, permitting quick moves, fast spotting in front of a furnace door. When called upon to push a number of buggies in addition to accelerating the charger, the series motor automatically provides more torque to handle the increased load and the operating current is not excessive because the motor has adjusted itself to a slower speed. To handle an overload, such as pushing a train of buggies, the bridge motor develops still greater torque with a further reduction in speed to satisfactorily handle this condition of overload.

EC&M TIME-CURRENT Acceleration also adjusts itself automatically, permitting a variation in time and torque to provide equally as efficient operating results. Under light loads, acceleration is fast, making it possible to get under way rapidly. As the load increases, more time is automatically provided so that operation is not interrupted by tripping of the overload relays due to closing of the acceleration contactors more rapidly than the motor is able to accelerate the heavier load. On an overloaded condition, Time-Current Acceleration forces acceleration by closing successive controller steps at intervals of a maximum of 2 seconds or more per step. This increases torque, insuring that the motor must accelerate the load or be disconnected from the line.



EC&M Full Magnetic Control is designed
operating results throughout, being equipped
Time-Current Acceleration but also with LINE
netic Contactors. Specify this logical system
your direct current motor drives.

THE ELECTRIC CONTROLLER & MFG. CO. E&M CLEVELAND, OHIO

HEAVY DUTY MOTOR CONTROL FOR CRANES, MILL DRIVES AND MACHINERY • BRAKES • LIMIT STOPS • LIFTING MAGNETS AND AUTOMATIC WELD TIMERS.

EC&M { LINE-ARC Contactor / TIME-CURRENT Acceleration } Full Magnetic